



❁ PRINCIPAL CONTENTS ❁

Chemistry in Agriculture
Manure Trials with Potatoes
Lucerne Top-dressing Tests
Codling Moth Control Experiment
Household Insect Pests
Hints for the Poultry Farmer

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VICTORIA, AUSTRALIA.

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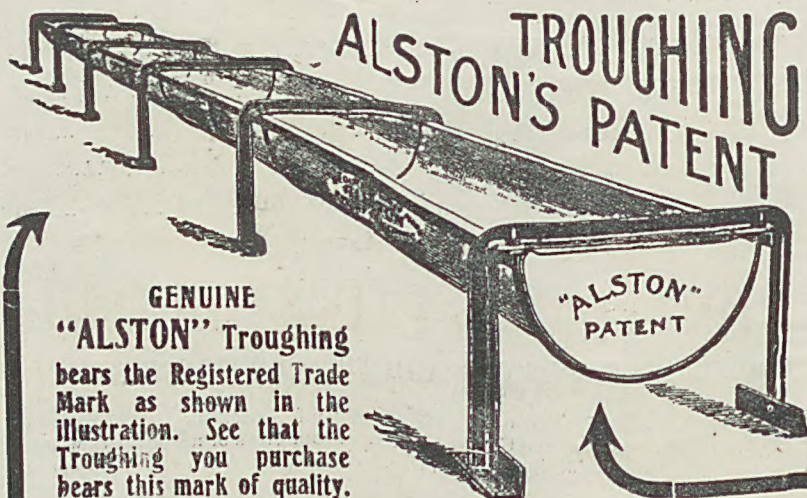
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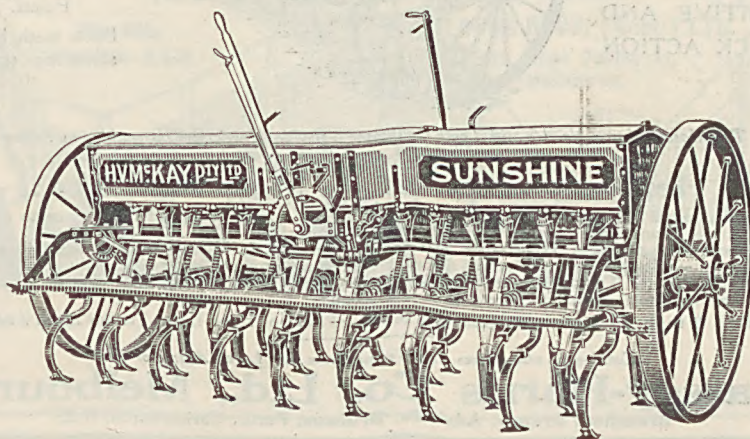
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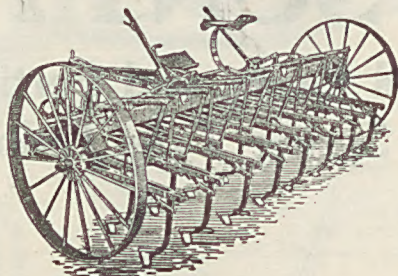
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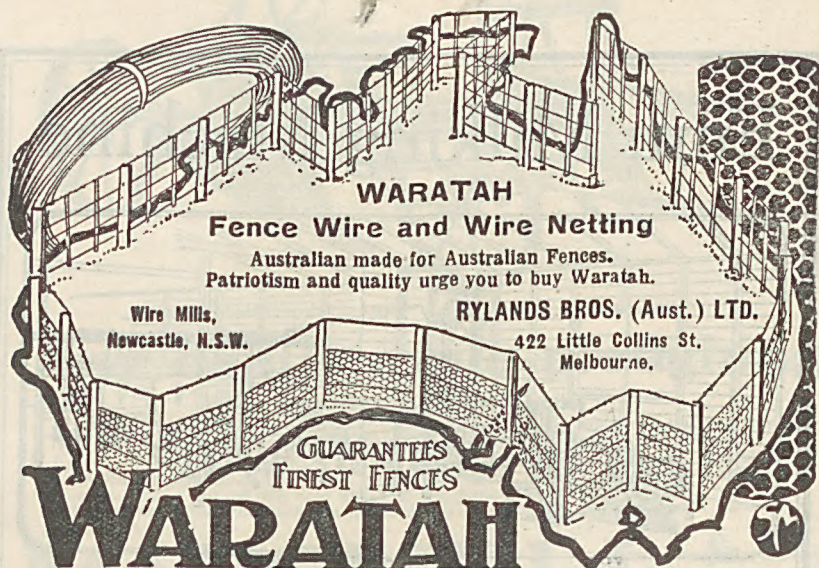
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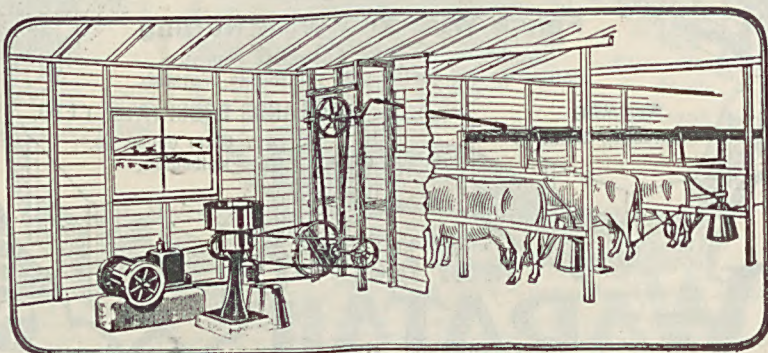
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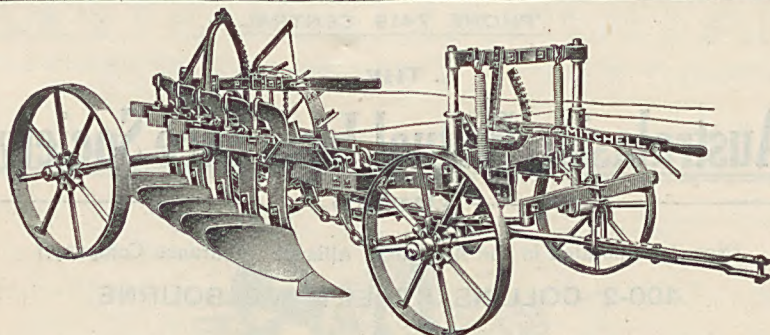
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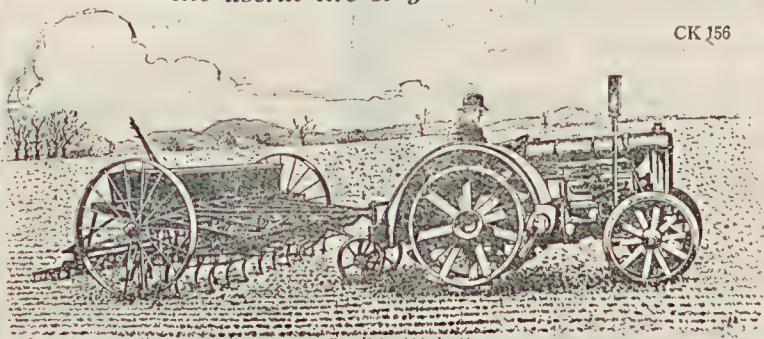
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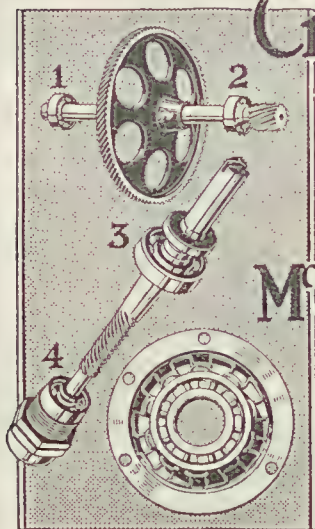
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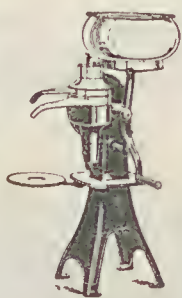
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Vol. XXVI.

August, 1928.

Part 8

CHEMISTRY IN AGRICULTURE.

NITROGENOUS FERTILIZERS.

By W. R. Jewell, M.Sc., &c., Agricultural Research Chemist.

In the July issue of the *Journal* the chemistry of crops and soils was dealt with, and it was shown that nitrogen, phosphoric acid, and potash comprised what are known as essential plant foods. If a soil be deficient in any or all of these, that deficiency must be remedied by the application of fertilizers. In this article it is proposed to deal with the chemistry of nitrogenous fertilizers only, discussing the sources of agricultural nitrogen and the present trend in manufacture.

It may seem curious that there should be anywhere a shortage of nitrogen for agricultural purposes when it is remembered that there are millions of tons of it in the atmosphere and that the soil is in perpetual contact with it. The difficulty lies in the fact that the nitrogen of the air is "free," that is, it is not combined chemically with any other element, whereas plants can assimilate nitrogen only when it is chemically combined or "fixed." The problem of supply is, therefore, not to find nitrogen, but rather "fixed" nitrogen, or to find methods of fixing atmospheric nitrogen.

There are to-day at least seven sources of agricultural nitrogen, according to H. A. Curtis in "Chemistry in Agriculture," viz.:—

1. Nitrogen compounds carried down by rain and snow.
2. Nitrogen captured from the air by bacteria living in the soil or on the roots of legumes.
3. Animal manure.
4. Nitrogenous waste materials, such as dried blood.
5. Chilean nitrate of soda.
6. Sulphate of ammonia produced in coking coal.
7. Nitrogen "fixed" from the air by chemical processes.

1. *Nitrogen Compounds Carried Down by Rain.*—Rain carries down a small amount of nitrogenous compounds, up to 5 lb. per acre per year, but the amount is very small compared with plant requirements, and one over which man exercises no control.

2. *Bacterial Fixation of Nitrogen.*—Certain bacteria "fix" nitrogen, i.e., convert free nitrogen from the atmosphere into nitrogenous compounds. Of these, one kind makes its home on the roots of legumes such as clover, peas, &c. In this way the farmer can "grow" a certain amount of nitrogen, for by ploughing in a legume crop the nitrogen content of the soil is increased. It is not yet known how bacteria fix nitrogen, although the amount so fixed is very considerable, and is much more than that which enters the soil by any other means. But the farmer has little control over the bacterial life of his soils—other than by growing legumes, which is not always economically sound—so that it is important that he should have other sources of cheap nitrogen.

3. *Animal Manures as Source of Nitrogen.*—From time immemorial agriculturists have used animal manures as fertilizers. These contain not only nitrogen, but other desirable plant foods drawn from the soil by the plants which served as food for the animal. Hence using the manures of domestic animals is only a means of returning to the soil part of the nitrogen taken from the soil by crops, so that such a process can never increase the reserve of nitrogen in the soil, although the farmer has a degree of control over the subsequent distribution of nitrogen on his farm. Though the use of animal manure does not build up the nitrogen reserve of the soil, but only decreases the rate of depletion, nevertheless the importance of this common practice of manuring cannot be overlooked, and, where available, farmyard manure probably represents the cheapest kind of nitrogenous fertilizer. However, there is far too little of this form of fertilizer available, and the supply will decrease as time goes on.

4. *Nitrogenous Waste Materials.*—Blood, blood and bone, &c., are of considerable value as nitrogenous fertilizers, but they will always form a relatively small source of nitrogen for agriculture.

5. *Chilean Nitrate.*—Chilean nitrate has been used for nearly 100 years, and the output has reached over 2,000,000 tons per annum. The nitrate deposits are located on a narrow desert strip on the eastern slope of the coastal range of Chile, and occur in beds from 4 to 12 feet thick, usually overlain by a sandy deposit. The crude nitrate is dug up and transported to plants where the nitrate is leached out with water and recovered by evaporation. As the Chilean deposits are the only ones in the world, Chile has had practically a monopoly of the supply. During the past few years the development of the air-nitrogen industry has modified this monopoly, and the quantity of nitrogen obtained from the air has actually exceeded that shipped from Chile. Competition is keen, and is becoming keener, forcing improvements in production in Chile and probably bringing about reduction in price.

6. *Ammonium Sulphate from Gas Works.*—When coal is distilled in the process of making gas and coke, part of the fixed nitrogen in the coal is recovered as ammonia, and this ammonia can be converted by simple chemical means into ammonium sulphate, a material which

finds very wide use as a source of agricultural nitrogen. The amount produced will increase only as the coke and coal-gas industries expand.

7. *Air Nitrogen Products.*—We now come to the most modern method of producing agricultural nitrogen, i.e., the fixation of atmospheric nitrogen in chemical form. This was a problem of considerable difficulty, which involved many years of patient and expensive research, but several methods have now been brought to a commercial success. The first was the *Arc Process*, wherein air is passed through an electric arc, thus producing small amounts of nitrogen oxides, which are dissolved to form nitric acid. The raw materials are certainly cheap, but the amount of power required for operating the electric arcs has limited the process to those locations where electric power has been developed cheaply and where such power has found no other market.

The Cyanamide process requires less power, but more in the way of raw materials and labour. Cyanamide is used in America and elsewhere to a limited extent as a fertilizer, but it has a number of undesirable qualities.

The most modern fixation method is the *Synthetic Ammonia process*, which represents a new type of commercial chemical process destined to be of great importance in the chemical industry of the future. If hydrogen and nitrogen are brought together under ordinary conditions of temperature and pressure, nothing happens. But if these gases be brought together at somewhat elevated temperature and pressure, they will react to form ammonia, and the rate of this reaction can be enormously accelerated by bringing the hot compressed gases in contact with the surface of certain solid material known as catalysts.

This process was brought to maturity in Germany during the war, when that country was cut off from Chilean nitrate, used in the manufacture of explosives. After the war the nitrogen produced in these factories was diverted largely to agricultural purposes. One huge plant has a capacity of about 200,000 tons of fixed nitrogen per year, which alone is equivalent in nitrogen to about two-thirds of the whole annual shipment of Chilean nitrate. Factories to produce synthetic ammonia from atmospheric nitrogen have followed in other parts of the world. Imperial Chemical Industries Limited have a vast factory at Billingham in England, scheduled this year to produce 250,000 tons of sulphate of ammonia. The nitrogen fixed as ammonia may be converted into sulphate of ammonia for agricultural purposes, while a part is turned into nitric acid, ammonium nitrate, anhydrous ammonia, &c., for use in various chemical industries. Again, it may finally appear as urea, a new synthetic nitrogenous fertilizer in which the nitrogen combination resembles that in blood. The fixed nitrogen may also be combined with phosphoric acid, and perhaps potash, to form highly concentrated, complete, synthetic fertilizers, which, while of limited application in Victoria at present, are undoubtedly an important development in the fertilizer industry, and one bound to have increasing significance in the near future, especially in countries undergoing very intense cultivation.

The result of this tremendous output of synthetic nitrogenous fertilizers is of paramount importance to every farmer who uses

nitrogen. Competition is particularly keen between rival nitrogenous fertilizers, and will become more pronounced. Experts calculate that the saturation point, or limit of agricultural absorption of the nitrogen produced, will be reached in about twelve months time. The net result of this activity will be a decrease in the cost per unit of nitrogen to the farmer, probably the most important aspect from his point of view.

Of the chemical nitrogenous fertilizers, Chilean nitrate held first place until a few years ago, followed by ammonium sulphate, with synthetic air products filling last place. This order to-day is exactly reversed. Air nitrogen products supply most nitrogen to agriculture, by-product ammonium sulphate comes second, and Chilean nitrate third. The significance of this change is profound, for it means that the chemical processes of nitrogen fixation have reached such a stage of development that agriculturists can never be cut off from a nitrogen supply. The Chilean nitrate beds will eventually be exhausted, gas-works sulphate of ammonia is strictly limited in production, but the earth's atmosphere contains literally millions and millions of tons of nitrogen which now, through chemical processes, can be utilized to whatever extent agriculture demands. Improved technology in the manufacture of air nitrogen products will further cheapen nitrogenous fertilizers, at present the most costly of all fertilizers.

Curtis concludes that as far as the future sources of agricultural nitrogen are concerned, it is hard to foresee what advances will be made, but there are indications that give some grounds for prediction. It seems clear that nitrogenous waste materials will be largely replaced by synthetic nitrogenous salts. Animal manures will be used where available, but will supply relatively less and less of the total agricultural nitrogen. Chilean nitrate will continue to be an important source as long as the supply lasts, or until driven from the market by cheaper air-nitrogen competitors. The increasing demand for nitrogen compounds must be met chiefly by expanding the air-nitrogen industry, and eventually by-product nitrogen sulphate and the synthetic air-nitrogen products must probably supply the great bulk of agricultural nitrogen. But no one can say what new things chemistry may bring to light with regard to nitrogen-fixing bacteria or with regard to yet undreamed of methods of getting nitrogen into the soil. One thing does appear certain, and that is that the problem of agricultural nitrogen is becoming more and more completely a chemical problem.



HOUSEHOLD INSECT PESTS.

By G. T. Levick, B.Ag.Sc., Assistant to Entomologist.

White Ants (Termites).

White ants are a fairly common pest in houses in Victoria, sometimes being the cause of considerable damage to the building. The two species concerned, according to Mr. G. F. Hill, are *Porotermes Adamsoni* and *Coptotermes acinaciformis*, the former being responsible for the greater part of the damage.

White ants live in a community, to some extent analogous to a hive of bees. The nest contains a single queen, whose sole duty it is to lay eggs. These eggs are attended to and the young larvae reared by the workers, who also do all the work of the community, such as building and extending the nest.

The workers are of a dirty yellowish-white colour, a little over a quarter of an inch in length, somewhat similar in appearance to an ant, but without the typical constriction between the thorax and the abdomen.

Another type of white ant found in the nest is known as the "soldier." This ant is similar in appearance to the "worker," but is distinguished by the very large head armed with a formidable pair of mandibles. The duty of the "soldiers" is to defend the nest in times of danger. Other forms are sometimes found in the nests.

The workers and soldiers are quite blind, and do all their work in the dark. When it is necessary for them to come to the surface, as when crossing stonework, they build covered tunnels of clay and woody material, only the heads of the workers being exposed at the entrance as the tunnel progresses.

At certain times of the year winged males and females appear. These are darker in colour than the workers, being of a brown to dark-brown colour, and possess long wings extending far beyond the end of the body.

The winged forms emerge from the nest in a swarm, and pair, and each couple flies to a place to begin a new nest. The wings are then cast off, and the female begins to lay eggs. Few of the multitude of termites which emerge from the nest succeed in starting a new colony, many falling prey to their numerous enemies, or being otherwise destroyed.

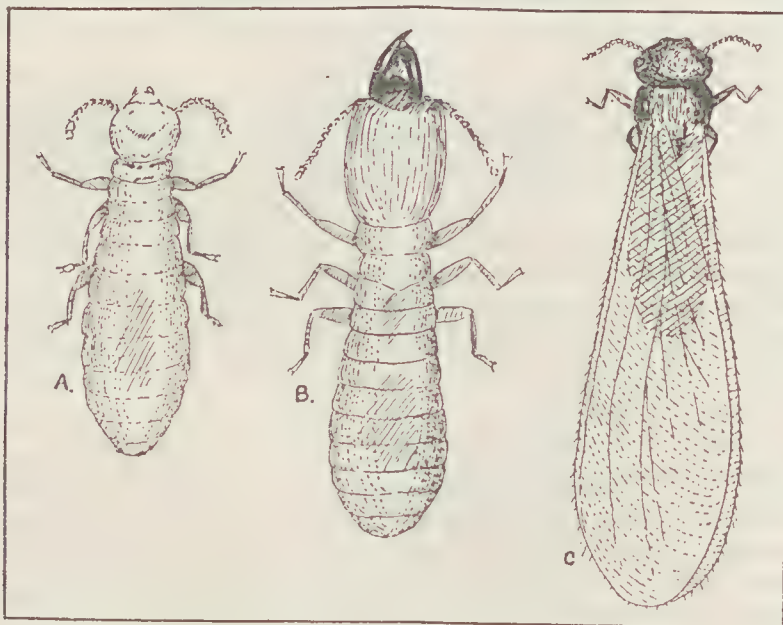
HOW HOUSES BECOME INFESTED.

Infestation generally takes place by a pair of winged white ants finding a suitable spot to start a nest somewhere about the house at the ground level. Some infestations perhaps originate from white ants introduced in the firewood. When the workers are bred, they begin eating the timbers in the vicinity and run tunnels up the inside of the wood, frequently extending them considerable distances through the building. As the white ants never come to the surface, they may do considerable damage before their presence is indicated, maybe by the collapse of some portion of the building, sometimes on the first or second floor. However far the white ants may go in a house, however, it is necessary that they maintain a connexion with the ground. So vital is this, that if the ground connexion is severed, those ants in the building will die in a very short space of time. This fact is made use of in the control of the insects.

REMEDIES.

When it is known that white ants are in a building, the first step to be taken is to locate the spot where they come in contact with the soil. This may be a fairly difficult matter, but it is quite essential if the pests are to be eradicated. In some cases the connexion is through the wooden stumps on which the building is erected, and little or no indication may be seen from the outside, but on sounding the stumps it is fairly easy to discover which of them have been bored. More rarely, the insects will build covered tunnels over the surface of brick, stone, or concrete foundations, thus reaching the woodwork of the floors and walls.

Affected stumps should be removed and replaced with new timbers which have been soaked in a mixture of equal parts of creosote and



White Ants.

A. Worker.

B. Soldier.

C. Winged Female.

kerosene. The tunnels over the stonework, &c., should be removed, and the surface given a liberal coating of the kerosene-creosote mixture. If the nest is found in the ground beneath the house, it should be removed and burned, and in all cases the soil should be given a liberal soaking of the kerosene-creosote mixture. It is a good precaution to treat the whole of the underneath portion of the building at the same time.

The borings of the white ants should then be traced into the building, and defective timbers removed and replaced by creosoted ones. As they attack timber from the ends, and work along the grain, always keeping away from the surface, it is evident that timbers, if possible, should be treated after cutting to size, but before being placed in position in a building.

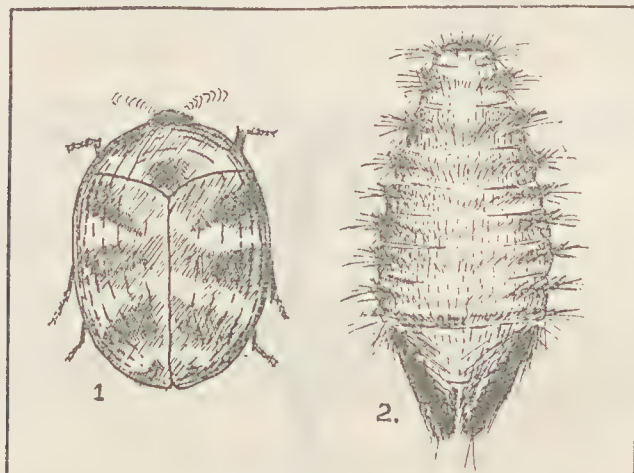
Where the ants are known to be a serious pest, it is advisable to have no timber of any kind in contact with the ground, brick, concrete,

or stone foundations being used, and at the same time to treat all wood coming into direct contact with such stonework.

While woods vary somewhat in their resistance to the ants, none is immune except the Murray Pine; at any rate, the timber from this tree is exceedingly rarely touched.

The Carpet Beetle (*Anthrenus varius*)

This beetle is a frequent pest, both in warehouses and shops, and also in private houses. The larva lives on all types of fabrics of animal origin, its taste ranging from museum specimens to carpets and silken and woollen fabrics. In the house, its depredations are very similar to those of the better known Clothes Moth, but its distinctive little hairy larva or maybe its cast skins indicate the presence of the carpet beetle.



The Carpet Beetle.

1. Adult.

2. Larva.

The beetle is very small, about one-eighth of an inch in length, and of a similar shape to the ladybird beetle. In colour, it is a marbled brown and grey, though on specimens black patches may be seen where the coloured scales have rubbed off, showing the black ground-colour beneath. This beetle flies about the house, and lays its eggs on food suitable for the larvae, which hatch in a few days. The larvae are small hairy grubs, measuring about three-sixteenths of an inch in length when full grown, of a dark-brown colour, with lighter stripes between the segments. They are fairly active creatures, moving rapidly with six legs, and feeding voraciously. They undergo a number of moults as they grow, and the cast skins of the larvae are often rather conspicuous. When mature, the larvae pupate within the last larval skin, later emerging as adult beetles.

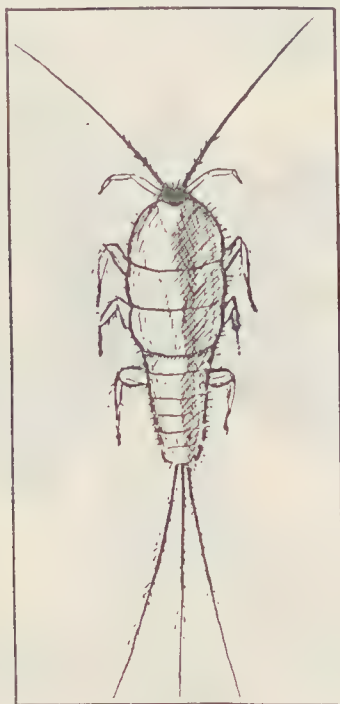
CONTROL MEASURES.

Carpets are generally attacked on edges under furniture, &c., and when signs of the presence of the beetle are noticed, the carpet, and the floor and skirting boards in the vicinity should be given a thorough soaking with benzine or one of the proprietary liquid insecticides. If possible, the carpet should be taken up, thoroughly beaten, and hung in

the sun for a few hours. An examination of the spot should be made in about a fortnight's time, and, if necessary, the application repeated, as it is possible that a few eggs may have survived the first treatment.

When fabrics in cupboards, &c., are attacked, similar treatment will be found effective; particular care must be taken to give all cracks and crevices a good soaking. It should be noted that benzine fumes are extremely inflammable, and there should be no naked light in the vicinity when carrying out the treatment.

Warehouses and shops which are badly infested should be fumigated with carbon bisulphide or hydrocyanic acid gas, though small infestations can be very satisfactorily controlled by the measures given above.



Silverfish.

Fumigation with either of the substances mentioned is rather a dangerous operation, and should be entrusted to an expert.

Silverfish (*Lepisma saccharina*).

These insects are very widespread, being in small numbers in nearly every house.

DESCRIPTION.

The silverfish varies from one-third to one-half an inch in length; its colour is that of glistening silver; it is somewhat fish-shaped, from which it takes its popular name. It has very prominent antennae or feelers, and three long, bristle-like appendages at the tip of the body.

It is very active in its movements, gliding to crevices and disappearing with remarkable activity when disturbed.

DAMAGE.

This insect is a serious pest in libraries, where at times it eats the binding of books. It has a decided liking for glazed paper, and sometimes does much damage to framed prints, eating off the entire surface. Any linen, curtains, or fabrics stiffened with starch are attacked if they are stored in dark places. Silverfish are especially prevalent in damp houses, and the presence of large numbers frequently indicates that the ventilation beneath the floor is not as good as it should be. Otherwise, the insects should not cause appreciable damage unless goods, as indicated above, are left undisturbed for considerable periods.

REMEDIES.

Unless the silverfish are very numerous, or damage is being caused by them, it is generally not worth while to take any special measures against them, as the ordinary house cleaning will keep their numbers down.

When cupboards or other dark places are infested, the contents should be removed, and the cupboard cleaned, and sprayed liberally with petrol or sprinkled with borax. The use of ordinary insecticidal dusts and powders is also effective.

A poison bait may be used to control the insect, but this is not suitable for use in places where children have access. The bait is made as follows:—

A thick starch paste is prepared, and a liberal amount of arsenic added. This is spread on slips of cardboard, which are placed in crevices in which the silverfish occur.

Fumigation, as for other household pests, is effective, but the expense is rarely warranted.

Book Lice (*Psocids*).

These insects are frequently found on rattan furniture, in cupboards where books, old papers, and periodicals are stored, and wherever dried vegetable matter of any kind is left undisturbed. They do little actual damage, but their presence and the sight of them running about is often most annoying.

While these insects are generally known as book lice, they are not in any way related to the true lice. In general outline and in their very active movements, they do, however, somewhat resemble the lice, but are very pale, almost transparent in colour, and measure about one-sixteenth of an inch in length.

REMEDIES.

Cupboards may be fumigated with carbon bisulphide, used at the rate of 1 lb. per 100 cubic feet. The required amount of carbon bisulphide is poured into a saucer or other shallow receptacle, which is placed on top of the contents of the cupboard. The whole is closed up for 48 hours.

The fumes of the bisulphide are explosive, and care must be taken not to let a naked light come in contact with them.

In other cases, the insects are easily killed by spraying with benzine or with one of the liquid insecticides. This should be thoroughly done, as the materials only kill on contact.

Fleas.

Fleas are small, wingless insects, rather remarkable in that they are flattened laterally.

The eggs are laid about the sleeping places of animals; they are tiny, glistening, white bodies. They hatch in a few days, the larvae being slender, legless, worm-like creatures, which feed on organic matter in the dust lying about. On becoming full grown the larvae pupate, later emerging as the adult flea.

The length of the life cycle varies from two weeks to a couple of months or more, according to temperature and humidity.

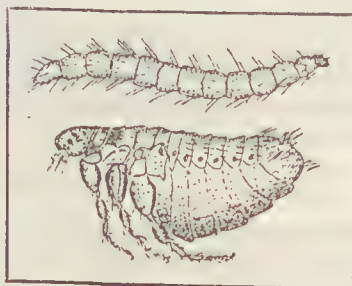
The adult lives on warm-blooded animals and birds, each species of flea keeping, as a rule, to a particular species of animal, biting the other animals only by necessity. Blood is said to be necessary before egg-laying can take place.

REMEDIES.

When houses are infested the rooms should be thoroughly scrubbed out with hot water, to which if possible phenyle has been added, and soap.



Book Louse.



Flea and its Larva.

Sheds, dog kennels, and other outbuildings infested should be cleaned out, and all the sweepings burnt. They should then be thoroughly sprayed with benzole emulsion, at the rate of 1 lb. in 5 gallons of water.

Occasionally during the summer months fleas breed in large numbers in the sandy soil in some of the Melbourne suburbs, sometimes becoming so numerous that people are unable to go into their gardens but they will "pick up" several of the pests. Benzole emulsion is an effective remedy in this case.

Fleas are found almost wherever dogs and cats are kept, but these are chiefly the dog fleas (*Ctenocephalus canis*), and they do not worry human beings to any extent. However, it is advisable to keep the animals free from the parasites by the following measures:—

The animals should be provided with rugs or sacks to lie on, and these should be frequently brushed or shaken, and the dust containing eggs and young larvae of the fleas thrown into a fire.

The animals should be regularly washed with soap and water, to which phenyle has been added.

CODLING MOTH CONTROL.

EXPERIMENTS AT HARCOURT.

By G. T. Levick, B.Ag.Sc., Asst. to Entomologist.

During recent years, apple-growers all over the world appear to have had increasing difficulty in obtaining a satisfactory control of the codling moth, in spite of the better chemical analyses of modern arsenate of lead and the improved spraying machinery. It is difficult to account for this, but the theory has been advanced that the continuous use of lead arsenate has led to the evolution of a strain of codling moths which is partially immune to arsenical poisoning.

This, together with the action of the Imperial authorities in forbidding the importation of apples on which there is arsenic beyond the low maximum fixed by regulation, has concentrated attention on sprays other than the arsenicals.

The experiments at Harcourt were initiated by the Department of Agriculture in the 1926-27 season, on the property of Mr. T. Code, and hereunder is an account of the work done and results obtained last season.

The objects of the experiments were threefold, namely, to reduce the amount of arsenical residue on sprayed apples by combining ovicidal (egg killing) materials with arsenate of lead; secondly, to time the ordinary arsenical sprays (having regard to life history records) so that each spray would have the maximum effect, and thus reduce the number of sprays necessary to control the moth; and, thirdly, to discover the strength of arsenate of lead that is most effective.

All sprays were applied with a spray-gun, at a pressure of 250-300 lb. per square inch. Arsenate of lead in paste form was used throughout. Blocks A1, A2, A3, and A4 consisted of ten trees each, while Blocks B, C, and D contained 50 trees each.

SECTION 1.—TEST OF POISON SPRAYS SUPPLEMENTED BY OVICIDAL SPRAYS.

Spray No.	Material.	Date Applied.
BLOCK A1.		
1st	Arsenate of lead 5 lb./80 galls. water	Oct. 17
2nd	Arsenate of lead 4 lb./80 galls water	Oct. 24
	+ Nicotine sulphate 1 lb./80 galls. water	
3rd	Arsenate of lead 4 lb./80 galls. water	Nov. 25
	+ Nicotine sulphate 1 lb./80 galls. water	
4th	Arsenate of lead 4 lb./80 galls. water	Dec. 29
	+ Nicotine sulphate 1 lb./80 galls. water	

SECTION 1 (CONTINUED).—TEST OF POISON SPRAYS SUPPLEMENTED BY OVICIDAL SPRAYS.

Spray No.	Material.	Date Applied.
BLOCK A2.		
1st	Arsenate of lead 5 lb./80 galls. water	Oct. 17
2nd	Arsenate of lead 4 lb./80 galls. water	Oct. 24
	+ Lime sulphur 2½ lb./80 galls. water	
3rd	Arsenate of lead 4 lb./80 galls. water	Nov. 25
	+ Lime sulphur 2½ lb./80 galls. water	
4th	Arsenate of lead 4 lb./80 galls. water	Dec. 29
	+ Lime sulphur 2½ lb./80 galls. water	
BLOCK A3		
1st	Arsenate of lead 5 lb./80 galls. water	Oct. 17
2nd	Arsenate of lead 5 lb./80 galls. water	Oct. 24
3rd	Volck spraying oil 1 in 32	Nov. 21
4th	Volck spraying oil 1 in 32	Dec. 12
5th	Volck spraying oil 1 in 32	Jan. 3
BLOCK A4		
1st	Arsenate of lead 5 lb./80 galls. water	Oct. 17
2nd	Arsenate of lead 4 lb./80 galls. water	Oct. 24
3rd	Arsenate of lead 4 lb./80 galls. water	Nov. 25
4th	Arsenate of lead 4 lb./80 galls. water	Dec. 29

SECTION 2.—TO TEST THE RELATIVE EFFICIENCIES OF DIFFERENT STRENGTHS OF ARSENATE OF LEAD.

Spray No.	Material.	Date Applied.
BLOCK B.		
1st	Arsenate of lead 8 lb./80 galls. water	Oct. 24
2nd	Arsenate of lead 4 lb./80 galls. water	Oct. 26
3rd	Arsenate of lead 4 lb./80 galls. water	Nov. 25
4th	Arsenate of lead 4 lb./80 galls. water	Dec. 28
BLOCK C.		
1st	Arsenate of lead 5 lb./80 galls. water	Oct. 17
2nd	Arsenate of lead 5 lb./80 galls. water	Oct. 21
3rd	Arsenate of lead 5 lb./80 galls. water	Nov. 21
4th	Arsenate of lead 5 lb./80 galls. water	Dec. 24
BLOCK D.		
1st	Arsenate of lead 8 lb./80 galls. water	Oct. 20
2nd	Arsenate of lead 8 lb./80 galls. water	Nov. 11
3rd	Arsenate of lead 8 lb./80 galls. water	Dec. 23
BLOCK E.		
Unsprayed control.		

RESULTS.

In blocks A1, A2, A3 and A4 the results were computed by actual count of the number of apples on each tree, and the number affected with codling. In blocks B, C, and D, the results were taken from the number of cases from each variety, and the number of cases rejected for codling injury.

The results from any one block showed a fair amount of variation owing (1) to differences in variety; (2) to differences in time of picking.

Late varieties were invariably more heavily infested during the 1928 season owing to an exceptionally heavy emergence of moths late in the year, and to the fact that no spraying was done after 3rd January.

The blocks were selected, however, with a view to having an approximately equal proportion of the different varieties in each, so that the average results should be strictly comparable.

Block No.	Per Cent. Affected by Codling.	Average Per Cent.
A1	9.3 — 20.0	15.3
A2	11.2 — 17.8	14.9
A3	0.0 — 9.1	4.7
A4	15.8 — 23.0	21.5
C	8.0 — 19.2	13.7
D	6.0 — 19.5	14.0
E	70.0 — 81.0	75.3
B (see note)	8.7	8.7

NOTE.—Block B is not comparable with the rest, as it was a block of 12-year-old Jonathans. The other blocks were mixed varieties of 30-year-old trees.

These results show two outstanding features:—

- (1) With conditions such as obtained this season, arsenate of lead alone failed to give a satisfactory control. It must, however, be remembered that the trees were large and old, and that in computing the results all apples, including windfalls during the growing season, were counted.
- (2) The only block which showed a satisfactory result, A3, treated with two calyx sprays of arsenate of lead, followed by three sprayings with "Volek" Summer Spraying Oil, 1 in 32, stood out from the beginning of the fruit season. It was only late in the season that any attack by codling moth could be detected, and this seems to be by far the most promising line of investigation and will be extended considerably next year. The strength used (1 in 32) was concentrated, but no sign of burning or injury to the trees was to be seen except to a very minor degree in one case, where the barrel was pumped right out on a tree and slight foliage burn resulted.

The following table, showing the treatment of three trees, all the same variety (Reinette), picked at the same time (15th February, 1928),

and alongside one another, gives a good illustration of the type of result from the oil spraying:—

Treatment.	Marketable Apples.	Affected with Codling.	Total.	Per Cent. Codling.
Block A1—Nicotine and lead ..	449	67	516	12.9
Block A3—Lead followed by oil ..	697	3	700	0.4
Block C—Lead 5 lb./80 galls. water ..	1,152	143	1,295	11.1

Apples from all blocks were analysed by the Agricultural Research Chemist (Mr. Jewell) for residual arsenic. Block C (four sprayings with lead arsenate, 5 lb. in 80 gallons) gave a result well under the limit laid down by the Imperial authorities, while the others were slightly higher.

It is worthy of note that the apples from block A3 (two arsenical calyx sprays followed by oil sprays) showed on analysis a residual arsenic content slightly higher than that allowable, notwithstanding that the last arsenical spray was applied on 24th October.

This would seem to indicate that oil prevents the arsenate of lead from washing off, hence there would be a big risk attached to replacing the last arsenical sprays with oil.

Little purpose appears to be served by increasing the strength of arsenic beyond the 5 lbs. to 80 gallons, except perhaps for the first calyx spray. Although block D had only three sprays, at a strength of 8 lb. in 80 gallons, against four on blocks B and C, the amount of residual arsenic was considerably higher, while the control of codling moth over two years showed no perceptible advantage.

Calyx sprays were applied in all cases, and practically no entrances through the calyx were found on any block, indicating that the efficacy of lead arsenate at the usual strength at this period leaves little to be desired.

FUNGICIDES ACT 1916.

ANALYSES OF INSPECTION SAMPLES.

By W. R. Jewell; M.Sc., &c., Agricultural Research Chemist.

The following tables give the results of analyses of inspection samples of insecticides and fungicides taken during 1927. No prosecutions were lodged as all samples complied with the particular standard and with the maker's guarantee. Warnings were issued in the cases of a few irregularities in labelling.

During the year a proclamation was issued proclaiming as weed destroyers all materials sold as such containing arsenic in any form or combination whatsoever. A standard was set and particulars prescribed as to labelling, so that manufacturers must now state on the label the guaranteed percentage of arsenic contained in the weed destroyer.

This action was taken to protect the purchaser, and to ensure that he was made aware of the presence of arsenic in such weed destroyers, so that he should not use them in ignorance of their arsenical nature. The necessity for this safeguard was made evident by the fact that one strongly arsenical weed destroyer was marketed with the claim that it contained no arsenic.

I. ARSENATE OF LEAD.

(1) LIST OF SAMPLES COLLECTED.

Sample No.	Brand.	Where Sampled.
1	Vallo—paste ..	A. Victor Leggo and Co., Footscray
2	Bluebell—paste ..	F. W. Prell and Co., 31 Queen-street, Melbourne
3	Bluebell—powder ..	F. W. Prell and Co., 31 Queen-street, Melbourne
4	Bergers—paste ..	Neptune Oil Co. Ltd., River-street, Richmond
5	Bergers—powder ..	Neptune Oil Co. Ltd., River-street, Richmond
6	Orchard—paste ..	A. H. McDonald and Co. Pty. Ltd., Richmond
7	Arsinette—powder ..	Cooper Engineering Co. Ltd., Spencer-street, West Melbourne
8	Yarra—paste ..	Parsons and Jaques, Patterson-street, Abbotsford
9	Carlton—paste ..	F. R. Mellor, 440 Elizabeth-street, Melbourne
10	Swift's—paste ..	D. and W. Chandler Ltd., Fitzroy
11	Green Cross—paste ..	Welch Perrin and Co. Pty. Ltd., South Melbourne

(2) RESULT OF ANALYSIS.

No.	Arsenic Pentoxide (As_2O_5)—on Dry Basis.		Water Soluble Arsenic Pentoxide (As_2O_5)—on Dry Basis.		Moisture.
	Guaranteed Minimum.	Found.	Guaranteed Maximum.	Found.	
	%	%	%	%	%
1	32	32.8	1	0.46	52.3
2	32	32.2	1	0.40	49.6
3	32	32.8	1	0.35	3.5
4	30	31.6	1	0.69	49.0
5	30	31.3	1	0.78	0.6
6	30	31.6	0.38	0.32	0.5
7	30	32.8	0.5	0.48	1.1
8	30	31.3	1	0.49	49.2
9	32	32.5	1	0.43	35.7
10	30	31.9	1	0.66	54.7
11	30	31.6	0.75	0.35	0.5

NOTE.—It will be seen that the samples comply with their respective guarantees. As guarantees are on dry basis, the moisture contents are included as being of interest in the case of pastes. Provided that a paste is chemically and physically satisfactory, the moisture content is of some importance, as the lower the moisture the greater the amount of lead arsenate present.

II. LIME SULPHUR.

(1) LIST OF SAMPLES COLLECTED.

Sample No.	Brand.	Where Sampled.
1	Vallo—Giraffe (Leggo) ..	Gill and Searle Pty. Ltd., 73 Elizabeth-street, Melbourne
2	Elephant (Jaques) ..	Law Somner Pty. Ltd., Block-place, Melbourne
3	Neptune (Neptune Oil Co.) ..	Neptune Oil Co. Ltd., Richmond
4	Yarra (Parsons and Jaques) ..	Parsons and Jaques, Abbotsford
5	Sulphinette (Co-op. Eng. Co.)	Cooper Engineering Co. Ltd., West Melbourne
6	Bluebell (H. Blyth Chem. Works)	F. W. Prell and Co., 31 Queen-street, Melbourne

(2) RESULTS OF ANALYSIS.

No.	Soluble Sulphur (% on volume).		Density—Degrees Beaume.	
	Guarantee.	Found.	Guarantee.	Found.
1	20-25	30.9	33	35
2	approx. 25	24.3	..	29
3	25	24.5	..	30
4	22-25	23.7	..	28
5	not less than 25	28.3	..	34
6	approx. 20-25	24.4	29	30

NOTE.—The form of guarantee in most instances above is not satisfactory, and manufacturers have been warned against further irregularities of this nature.

III. NICOTINE.

Brand.	Nicotine Guaranteed.		Nicotine Found.	
Vallo Nicotine Sulphate	..	40 %	..	39 %
Black Leaf 40 ..	..	40 %	..	39 %

IV. OIL SPRAYS.

Samples of the following brands of oil sprays were examined and found to conform to guarantee:—

Neptune Red Spraying Oil.

Elephant Red Oil.

Arboleum Miscible Oil.

Vacuum Red Spraying Oil.

It should be noted that, to obtain the best emulsion with water when preparing oil sprays, the methods of mixing prescribed by the manufacturer should be rigidly followed. Failure to do so often results in an unsatisfactory emulsion.

HINTS FOR THE POULTRY FARMER.

By W. C. Rugg, Chief Poultry Expert.

CHICKEN-POX.

Some poultry-farmers in Victoria have had a serious set-back this year, caused by a severe epidemic of chicken-pox amongst their birds. In the whole of my experience I have never known this disease to be so prevalent in any year; at least 50 per cent. of the correspondence received by me during the last couple of months has been in reference to it.

It is difficult to say why it should have been so prevalent this season; possibly it is due to the exceptional autumn experienced.

The bounteous rain in the early part of the year caused a wonderful growth of green stuff, and the spring-like conditions were exceptionally favorable for egg-production. Many farmers were jubilant at the number of eggs their birds were laying in February, March, and April. In a normal season these birds should have been gone into moult at that time, and have had their annual rest to grow a new set of feathers. Consequently, when the colder weather arrived, they were weak and less able to resist disease owing to the extra strain that had been put upon them in producing these extra eggs.

It is also possible that where mosquitoes were more numerous than usual they helped to spread the disease from bird to bird and flock to flock.

Whatever the cause, poultrymen would be wise to keep in mind the liability of poultry to contract the disease, for by taking simple preventative measures they can greatly lessen the severity of an outbreak, if not prevent it altogether.

Chicken-pox usually attacks birds in the late summer and early autumn, when they have almost completed their laying season, and often are weak and low in condition, owing to the strain of a long season of egg-laying. This is the time for the poultry-keeper, by judicious feeding and administering simple medicines, to try to put birds in such a condition that they will be able to resist the disease.

If poultrykeepers will start, say, with the new year, and give their birds mild doses of Epsom salts and sulphur once a week till April, they will save themselves a great deal of trouble and loss. The amount of Epsom salts recommended is 1 lb. to every 300 birds, say, every Monday, and 1½ lb. of sulphur every Thursday; the doses to be continued from January to April.

I find the best way to administer salts is to dissolve the grains in the water or soup with which the mash is to be mixed. By this means the dose is evenly distributed through the mash. In giving sulphur, it should be mixed thoroughly through the bran before the bran is wetted for the mash. In the case of birds that are fed on dry mash I find it a good plan to close the dry mash hopper at midday preceding the day on which the medicine is to be given, and to feed it to them in a wet mash. After the birds have eaten the wet mash allowance, the dry mash hoppers can be opened again.

The salts and sulphur treatment has been found effective on a great many farms, and this year it was noticeable that where no sulphur had been used, the outbreaks were very much more severe than where sulphur was regularly fed. In addition to salts and sulphur, fresh succulent green stuff is also a great help, and some should always be fed after the grain food at night. Minced raw onions, given twice a week at the rate of 5 lb. to each 100 birds, are a splendid tonic.

The first indications of chicken-pox are eruptions on the comb or wattles. As soon as any individual is attacked, it is wise to treat the whole of the birds in the flock at once by increasing the dose of Epsom salts to 3 lb., and the sulphur to $4\frac{1}{2}$ lb. The eruptions or warts should be painted with strong iodine. Houses must be kept clean and well sprayed with a good disinfectant, such as chloride of lime, carbosyl, or sheep dip. Plenty of good clean litter for the floors should be provided.

EARLY HATCHING ESSENTIAL.

Most poultrymen are now turning their attention to incubation and chicken-rearing, and everything points to a good hatching season. A tremendous increase has taken place in the number of birds kept for egg production, and there is evidence of a still greater increase in the coming spring.

The demand for breeding stock has been heavier than I have ever known before. A large number of poultrymen who sell both eggs for hatching and day-old chickens are fully booked up for all they can supply this season. I would strongly advise those who are contemplating purchasing settings of eggs or day-old chickens to see that they get delivery not later than September, that is, if the birds are required for egg production. For this purpose, late-hatched chickens are unprofitable, and if one cannot get chickens hatched before the end of September, he will be well advised to postpone his operations till next season.

With late-hatched chickens the mortality is high, and those that are reared are slow to develop, and usually come into lay when eggs are at a very low price, and therefore unprofitable.

FOR SUCCESS—START IN A SMALL WAY.

A number of people who are finding their present occupations not as profitable as they would wish get the idea they can become poultry-farmers; in fact, during the last few months there has been a wave of enthusiasm for poultry-farming passing over Victoria.

I have been almost inundated with letters for advice as to how, when, and where to start. I have interviewed some hundreds of people, most of them lacking in experience, and with very limited capital, and nearly all of them seemed to think that all that was essential was to purchase so many hens and provide them with food, and that an income was assured. In fact, many wrote to the effect that they just wanted to keep sufficient hens to return them £3 a week, and asked for particulars as to number required, &c. In some instances the only areas my correspondents had for their poultry-farms were backyards about 30 feet by 40 feet.

I find it a very difficult matter to convince such people that poultry-keeping for profit is a business, and like any trade or profession it must be learnt from the beginning. After many years of experience, and the opportunity of studying a great many men in the poultry business, it is my considered opinion that a man or woman to become a successful commercial poultry-farmer requires more brains, initiative, and determination than are required for success in quite a number of other occupations.

These remarks are not made with the object of discouraging people from opening poultry farms. I know, however, from my observation that the business will be profitable only for such as are prepared to start in a very small way, and extend their farms only when they find themselves adapted for the work.

Poultry-farming is a business that lends itself to very rapid expansion once the necessary experience has been obtained. The largest egg-producing farm in the Commonwealth, that of Messrs. Carter Bros., at Werribee, where there are 20,000 layers, and a farm still being extended, started but a few years ago with a hen and a clutch of chickens, and I know of many other farms now carrying from 3,000 to 16,000 birds which began in a humble way with a single breeding pen, or maybe a couple of settings of eggs. The proprietors of such farms have attained success, because they were satisfied to commence in a small way and learn the business thoroughly.

NEVER HATCH FROM SMALL EGGS.

I know that a large number of orders for eggs for hatching and for day-old chickens have been given this year, and I hope that poultrymen will "play the game" with their customers. No egg weighing less than 2 oz. should be hatched. If poultry-farmers persist in hatching from any and every egg irrespective of size, they will flood the country with birds that will lay eggs unsuitable for both local and overseas markets owing to their small size, and low prices and unprofitable business must follow. Buyers of eggs for hatching would be wise to insist that 2-oz. eggs be the minimum that they will receive and pay for; any under that should be promptly returned, for the buyer will certainly be better off without any pullets at all than with those capable of laying only small eggs; and even from 2-oz. eggs there will be hatched many pullets whose eggs will be on the small side.

WHY AN EXPORT TRADE IS ESSENTIAL.

Owing to the tremendous increase now taking place, the very existence of the poultry industry as a profitable one largely depends on the export of as many eggs as possible this season. The egg export season is a short one, and has now commenced, and it is the duty of every man and woman engaged in the industry to support the export of eggs to the utmost of their ability. If they do not, they will probably have a worse experience next year than they have just passed through. Recent bad prices were brought about by cool store eggs coming on to the market in large quantities. Many of these could and should have been exported to London, but in expectation of making greater profits locally during the winter and early spring, agents placed them in cold storage.

No industry can endure such sudden fluctuations in prices as took place early in July, when prices for new-laid eggs were dropped 8d. per dozen in a week and even lower. It is the duty of every man engaged in the poultry industry to see that this state of affairs is not allowed to be repeated next year. This he can do by setting apart a portion of his eggs, and seeing that they are exported through one of the agencies now seeking eggs to meet contracts in London.

THE FATTENING OF POULTRY FOR MARKET.

Unfortunately at the present time most of the birds consigned to the Melbourne markets reach their destination in a bad condition. Every farmer knows that with the larger animals, such as cattle, sheep, and pigs, generous feeding is an absolute necessity if the flesh is to have quality to attract the best buyers; yet the majority of the poultry-farmers (including turkey-breeders) send to market birds that have not been properly fed, and often they are so overcrowded in crates that many are half dead ere they reach the market.

The best method to fatten fowls is to provide coops in which they can be confined for ten to fourteen days, for it is not economical to feed heavily, and then allow the birds to "run off" the condition one is trying to put on them. These coops can be made 7 ft. 6 in. long, 20 inches high and deep, and divided into three compartments capable of holding four or five birds each. They can be built of any light battens; those in the front should be about $2\frac{1}{2}$ inches apart, so that the birds may be able to put their heads through to feed. The floor also should be of battens placed an inch or so apart to allow the droppings to fall through. The coops must be placed in a sheltered position. The main idea is to keep the birds warm, and to some extent in the dark. Quietness and freedom from excitement are essential for rapid fattening.

They should be fed on soft food; mashies of ground oats, ground wheat, and if possible bran mixed with milk. Milk improves the colour and quality of the flesh. Some fatteners mix the meal and milk a few hours before feeding time, and allow the mixture to stand. During this time slight fermentations takes place, and the feeding of fermented foods assists the process of fattening. Some farmers also add a little melted mutton fat or suet, and mix it carefully through the food. After being put into the coops the birds should not be fed for the first twelve hours; after that they should be fed every twelve hours as regularly as possible. At first they should be given as much food as they will eat in about ten minutes, and any that is left should be removed. Later, they may be given as much as they will eat in about twenty minutes. If any "go off" their food, they should be given their liberty for a few days and fed on grain.

Turkeys must be fattened as quickly as possible, for they will not endure close confinement very long. They will thrive best if fed night and morning in the manner just described. A change of food much relished by them is wheat soaked for about 24 hours in milk.

I have heard auctioneers called very hard names by dissatisfied country consignors, but it must be remembered that these auctioneers are dealing with buyers who know what good quality is, and they are prepared to pay for it. But it is an utter impossibility for the auctioneer to get high prices for under-fed, poor quality birds.

Victorian people are not alone in this neglect. I recently read reports from both South Australia and New South Wales deploring the number of poorly-fed birds that were being sent to market. There are buyers here willing to pay high prices for an article of good quality, and our poultry-farmers, because they are sending forward badly-fed birds, are losing thousands of pounds.

ORGANIZATION OF FLORIDA ORANGE-GROWERS.

The story of the Florida Citrus Exchange, which is a co-operative marketing organization similar to the California Fruit-growers Exchange, is too well known to all well-informed market men to require an extensive discussion from me at this time, says the Commissioner of State Marketing Bureau, Florida. It was organized in 1909. Fruit at that time was selling for \$1.34 per box. It had to make the same fight that all economic reforms have made against prejudice, scepticism, and self-interest. Like all human endeavours, it made mistakes. It could not do the impossible nor perform miracles. It was subject to all the disease germs of suspicion, selfishness, disloyalty, inefficiency, unfair criticism, and other ills incident to co-operative effort. It could not remove all the difficulties in the field of citrus production and distribution.

During the eighteen years of its existence constant changes and improvements have been made, adjusting the practices of the organization to the needs and customs of the trade; efforts have been put forth to improve the quality of the fruit handled; men have been employed who believe in co-operation; it has profited by these years of experience, and now controls about one-third of the citrus fruit produced in the State; it is composed of some 6,000 members divided into twenty or more district sub-exchanges, and about 125 local associations; it has a general manager, a president, a sales manager, production manager, and an advertising manager, and almost a nation-wide sales force. It has as competitors approximately 140 independent marketing organizations, some of them shipping several thousand car loads. Some of these non-co-operative or independent marketing agencies own many groves, and naturally they do not want membership in a co-operative. It is estimated that 20 or 25 per cent. of the bearing groves of the State are owned by independent marketing organizations, and they market approximately 65 to 67 per cent. of the fruit of the State.

Since last June there has been an effort by the Fruitman's Club composed of both the exchange and the independents, representing approximately 80 per cent. of the fruit of the State, to establish a clearing-house through which all the essentials of good marketing could be carried out. The prime purpose of the clearing-house is to bring about efficient distribution and otherwise foster intelligent marketing, and eliminate waste resulting from destructive competition.

Certificates of incorporation have been prepared, by-laws have been adopted, and a day has been set for final action, at which time the clearing-house will come into life or the whole matter dropped.

LESSONS FROM HERD TESTING WORK.

By W. J. Yuill, Senior Dairy Supervisor.

Throughout the world there are now some thousands of herd testing associations. There is nothing of the "hey presto!" of the conjuror about the work—nothing of a revolutionary nature—rather is the work accomplished by a process of evolution and education.

It is not too much to claim that the herd testing movement is the "schoolmaster" of the dairying industry; as with the schoolmaster's class, so, as a class, the dairy farmers have had their attention directed to certain lessons of great importance. Every teacher, unless he is very unfortunate, has apt pupils as well as those who learn slowly. With herd testing, there are those who acquire but a superficial understanding of it, and make a casual application of these lessons; on the other hand, there may be a full understanding and appreciation of their value and importance, together with a practical application of the information that science has made possible—through the scales and Babcock tester.

In most of the old world dairy countries—countries where dairying was carried on before white men came to this country—there are now very large numbers of herd testing associations. Germany has over 1,600, Denmark over 1,200, whilst in the United States of America there are nearly 1,000, all now at work. In Sweden there are over 600 associations, and even in Finland there are a similar number. Holland, Switzerland, Latvia, the Netherlands, and Ireland each have herd testing associations in hundreds.

In Victoria we are still using the scrub bull, the grade, and the untested pure-bred bull, while any animal with an established pedigree is eligible for registration in the herd book of its particular breed. Elsewhere the pure-bred bull of "production" ancestry is largely used.

Herd Testing in Sweden and Finland.

Sweden and Finland have been herd testing for over 30 years. With the increasing experience there has come a greater faith in the work. This is reflected in the fact that the whole of this dairying work is now based on the herd test records.

Mr. H. Nylander, Councillor of Agriculture, Finland, in September of 1927, says *inter alia*, that for some decades already, cattle-breeding in Finland has been based on the herd testing records. He also states that no cow is entered in a society's register unless the milk and butter-fat production be established for a minimum period of two years; similarly, no pure-bred bull is entered unless there is similar information regarding his dam.

Speaking of Sweden, Peterson and Johanson, at the close of last year, stated that no pure-bred bull can be entered in the breed register, or at any official sale, be sold for breeding purposes, or be awarded a prize of any kind from Government funds, or admitted under the Government scheme for improvement of cattle-breeding either for pure breeding or cross breeding, if he has not behind him complete pro-

duction records of all females in his ancestry for three generations on both his sire's and his dam's side. All females must reach the standard set for the breed, over a minimum period of three years' consecutive testing. No one will buy a female for breeding purposes if she has not a similar production pedigree, because sons from her cannot be sold for breeding purposes.

In Sweden, sale catalogues always contain information of at least three years' consecutive milking periods of animals offered for sale that have been milked for three seasons or more. These records include milk, test, butter-fat, and food units consumed. Such information can be obtained regarding the progenitors of every bull and cow offered for public auction.

These writers add, that as time has gone on the figures have taken on more and more importance in breeding work. They have received more and more official value until now they have become the basis for the whole breeding programme, and for the awarding of prizes at the shows. Production has become a necessary qualification for admission to the herd books of all breeds.

All in all, these records are the basis for the most constructive work in dairy-breeding and feeding that is being carried on in Sweden at the present time.

Herd Testing in America.

In America the herd testing movement continues to make headway. It is now known as the "Dairy Herd Improvement Association," and the record card is the accepted basis for all practical purposes and research work.

Practically the whole of the bulletins issued by the United States Agricultural Department are based on the data obtained by herd test associations. The work has developed an extensive field for research in such matters as farm costing, the comparison of feeding systems, the value of ensilage for dairy cows' rations. Extensive information has been made available regarding the influence of the pure bull as compared with grade or scrub bulls; comparisons of individual cows, of herds, of breeds, of strains or of families, of the cost of rearing dairy heifers, and, again, of the best time of the year in which to bring herd cows into milk.

Recording has made it possible to compare dairy cows by tens of thousands.

The writer of bulletin 364 says that it is only a matter of time when all stock, whether pure or grade, will be sold on their production records.

The records of 236 farms in this investigation showed that grade herds sired by bulls from high-producing pure-bred cows were more profitable than the pure-bred herds. He says there was a distinct tendency to retain "cull" pure-bred cows until pure-bred prices could be obtained, while the grade herds were being culled on production only.

Grade herds average 620 gallons, while herds sired by the "scrub" bull averaged only 480 gallons.

Calculations showed that it cost 6d. per gallon less to produce milk from 700-gallon cows than from those yielding less than 500 gallons. The 700-gallon cow required 11 lb. less concentrates per 100 lb. milk; also 31 lb. less hay, 20 lb. less green feed, roots, or silage. She required 1.5 days less depasturing, and, further, the actual work of milking her called for less labour.

The Best Time to bring Cows into Milk.

The records of 11,000 cows were investigated to ascertain which was the best time of the year for dairy cows to be in milk. It was found that autumn and early-winter-calving cows produced on the average about 11 per cent. more milk and butter-fat than the spring-calving cows.

When the records of thousands of cows are investigated, it is found that the life of a dairy cow is about seven and a half years, of which about five are of dairy usefulness. If the time of each year that a cow is dry—which, on the average, is about three months—is added to the two and a half years prior to coming into milk on her first calf, it will be seen that for only about one-half of her life is a cow being used for dairy work.

What a story could be told of thousands of cows which milk only for about six months of each year! Without records very few dairy farmers have ever realized how long their cows are out of profit in the "dry" paddock.

Feeding for Profit.

In the United States of America very extensive research has been made into most of the lessons of dairying work. As a result of their experience under varying conditions, the feeding system now extensively adopted, is to feed all cows as much as they will eat of succulent roughage, such as ensilage, together with a legume hay, the quantity of roughage being in the proportion of three to one. Practice has shown that it requires about 3 lb. of silage and 1 lb. of hay for each 100 lb. of live weight.

Old cherished ideas of feeding have been extensively scrapped, because the system just mentioned has everywhere been proved the most efficient and economical milk producer. Concentrates, of course, are added, but only where cows will respond to this additional feeding.

Under average conditions, it has been found that the cost of production for feed is, approximately, 50 per cent. of the total income from milk and butter-fat.

Further, it has been definitely proved that milk produced under pasture feeding conditions will cost approximately 3s. per 100 lb. less than when cows are barn-fed.

The 300 lb. butter-fat cow has been proved again and again to be able to produce 50 per cent. cheaper than the only too common 100-lb. cow, whilst the 400-lb. cow can produce butter-fat at a feed cost of 9d. compared with 20d. in the case of the 100-lb. cow.

Yet another lesson is that it is not the cost that counts, but rather the profit above the cost.

In the case of 35,000 cows whose average production was 287 lb. butter-fat, it was found that one-seventh of the number averaged nearly 200 lb. with a return of £11 over feed cost—one-fourth averaged nearly 300 lb., with a return of £19 over feed cost.

There was a difference of 50 per cent. in the production, and a difference of 77 per cent. in the profit.

In other words, eleven cows of the 300 lb. class made more profit than twenty of the 200 lb. class, with nine cows less to feed, milk and care for.

In yet another investigation into the records of 18,000 cows, it was found that as production rose from 100 lb. to 400 lb. of butter-fat per cow, there was a steady increase in profit over cost of approximately £6 for each 100 lb. increase.

Lessons the Victorian Dairyman should Learn.

Investigation has shown that the spring-calving cows are producing their maximum yield of milk when prices are lowest, while that of cows that calve late in the season decreases with the approach of dry conditions. Early-calved cows continue to milk well while green succulent feeding is available.

Experience in Australia teaches the great need of more legume hay, such as lucerne or clover, if we are to get the best from our herds.

Our records prove conclusively that pure-bred cows are not good because they are pedigreed; they are good dairy cows just to the extent of the concentration of dairy character that they possess.

Again, practically all of our high-producing grade herds have been bred from pure-bred sires which, in turn, have been bred from high-producing ancestry.

Testing has shown very conclusively that heifers bred along these lines, if properly fed during the first twelve months, will develop into the best dairy cows. It is from this class that one looks for heifers capable of producing 300 lb. of butter-fat on their first lactation.

Herd testing has proved that over-stocking makes for the worst form of under-feeding. In one instance that I know of the number of the herd was reduced from 47 to 35 without any appreciable difference in the total yield; there was sufficient feed for 35, but insufficient for 47. Again, a 37-cow herd was reduced to 25 with similar results.

It must not be overlooked that a charge of approximately £9 per cow should be allowed to offset all costs other than labour. With the average Victorian cow of to-day this means that a charge of 13½d. must be made against every pound of butter-fat she produces; with a cow producing 300 lb. butter-fat annually a charge of only 7½d. need be made. A number of herds in the State are now producing over 300 lb. butter-fat per cow per annum.

Better Cows.—Better feed should be our slogan, and the 300 lb. standard our goal.

MANURE TRIALS WITH POTATOES, 1927-28.

RESULTS AT CHILDERS, KORUMBURRA, CATANI, WARRAGUL, ILLOWA, WHEATSHEAF AND MUSK.

By J. T. Ramsay, Potato Expert.

The results of the manurial trials with potatoes in various centres of the State for the past season are given below.

Childers.

The season commenced with the months of October, November, and December, 1927, and the first part of January, 1928, being fairly dry, but phenomenal rains commenced in the middle of January and continued to the end of the season. Thus the season on the whole may be taken as a fairly favorable one. The class of soils on which the test at Childers was carried out was a red loam of fair quality, typical of much land in the district which is fast making a reputation on account of its suitability for potato production of high table and seed qualities.

The same manurial variations were applied as for the past five years, and on that account the figures are becoming increasingly valuable.

In arriving at the figures for the season, four areas in each manurial section were harvested, and the average of these taken. This practice eliminates considerably the margin for error which might exist owing to soil variation or variation in vigour of the seed. In setting out the results, only the weight of the marketable tubers is shown, and the tables show the acreage weight of these, together with increases due to manures, the cost of the manures, percentage increase, and the amount of manure costs for each ton increase.

The results substantiate the findings of the previous four years, and may be taken definitely as a direct indication of the correct method of manuring the potato crop for the district. As in previous seasons, the No. 6 dressing, consisting of 6 cwt. superphosphate and 1 cwt. ammonium sulphate, is outstandingly the best. Last season it produced the abnormal increase of no less than 174 per cent. The next best yield was obtained from No. 7 dressing, containing 6 cwt. super., 1 cwt. ammonium sulphate, and 1 cwt. sulphate of potash. This dressing, although giving excellent increase of crop, does not justify its expense as compared with the now well-known "6 and 1" application.

SOIL ANALYSIS, CHILDERS.

	Parts per 100,000.
Nitrogen	347
Phosphoric acid	99
Potash	226

The soil analysis at Childers is given above. This shows high nitrogen content, good potash, and a deficiency in phosphoric acid.

The tables are so self-explanatory that little need be said of them.

TABLE I.—RESULTS OF TRIALS AT CHILDERS, 1927-28.
Conducted on the farm of F. Mayo (red clay loam soil).

Plot.	Manure per acre.	Market size Tubers.	Increase due to Manure.	Manure Cost per Acre.	Cost per ton Increase.	Per- centage Increase.
		T. c. q.	T. c. q.	£ s. d.	£ s. d.	%
1	3 cwt. super.	5 10 0	3 1 1	0 19 6	0 6 5	103
2	6 cwt. super.	5 16 1	3 7 2	1 19 0	0 11 8	113
3	9 cwt. super.	6 15 0	4 6 1	2 18 6	0 13 6	145
4	6 cwt. super., 1 cwt. sulph. pot.	6 17 2	4 8 3	2 14 0	0 12 3	149
5	No manure	2 8 3	.. ..	.. ..	.. ..	..
6	6 cwt. super., 1 cwt. sulph. ammon.	7 12 1	5 3 2	2 15 9	0 11 10	174
7	6 cwt. super., 1 cwt. sulph. ammon., 1 cwt. sulph. pot.	7 3 3	4 15 0	3 10 9	0 16 8	161
8	3 cwt. market garden manure	5 5 0	2 16 1	1 8 6	0 10 0	94
9	3 cwt. basic phosphate ..	4 3 3	1 15 0	0 19 6	0 11 1	59
10	1 cwt. di-ammonium phos. ..	6 2 2	3 13 3	1 18 6	0 11 5	125
11	2 cwt. di-ammonium phos. ..	6 10 0	4 1 1	3 17 0	0 19 0	137
12	Farmer's own lot, 4 cwt. super., 1 cwt. ammon. sulph.	6 0 0	3 1 1	2 2 0	0 13 8	118

An interesting innovation last season was the introduction of a manure new to Victoria, viz., di-ammonium phosphate.

This is a highly concentrated artificial manure containing 52.5 per cent. phosphoric acid and 20.6 per cent. nitrogen as ammonia. In strength 1 cwt. of di-ammonium phosphate is equal to approximately $2\frac{1}{2}$ cwt., 22 per cent. superphosphate, plus 1 cwt. ammonium sulphate. This manure has given very satisfactory results during the past season—the first year it has been tried in Victoria. At Childers, however, it would seem to require fortification by the addition of superphosphate to bring it up to about the equivalent of the phosphoric and nitrogen content of the “6 and 1” dressing.

TABLE II.—AVERAGE RESULTS AT CHILDERS FOR FIVE YEARS,
1922-23 TO 1927-28 (INCLUSIVE).

Plot.	Manure per acre.	Yields.	Increase due to Manure.	Per- centage Increase.
		T. c. q.	T. c. q.	%
1	3 cwt. super.	5 12 0	2 16 2	101
2	6 cwt. super.	6 4 0	3 8 2	123
3	9 cwt. super.	6 6 2	3 11 0	129
4	6 cwt. super., 1 cwt. sulph. pot. ..	6 7 1	3 11 3	129
5	No manure	2 15 2	.. ..	..
6	6 cwt. super., 1 cwt. sulph. ammon. ..	7 7 0	4 11 2	165
7	6 cwt. super., 1 cwt. sulph. ammon., 1 cwt. sulph. pot.	6 19 0	4 3 2	150
8	3 cwt. market garden manure	5 10 1	2 14 3	99
9	3 cwt. basic phosphate	5 7 1	2 11 3	94

In calculating the cost per acre of manures, £1 per ton has been added to Melbourne prices to cover cost of transport.

The above table presents very interesting figures, giving as it does the average results of the various manures under Childers conditions for the past five years. The outstanding features are the remarkable consistency of the "6 and 1" dressing increases and the low return from the unmanured plots. The "6 and 1" application has given an average increase in the five years of no less than 165 per cent. over the unmanured areas, and is well ahead of any of the other dressings. It would seem, therefore, that potato-growers in this district would be well advised to make this application of manure to their potato crops until some other better combination of fertilizers be found.

Unfortunately, the favorable season over all the potato-producing districts in Victoria has produced a condition of glut on the market, and consequently a considerable loss to growers has occurred this year.

This state of things is non-remediable on account of the fact potatoes are a non-exportable commodity. That being so, it follows that a good season generally throughout the Commonwealth is reflected by low prices, and moderately good to unfavorable seasons have their reflexions in corresponding high prices. The market values per ton of the various seasons are always expressed obversely to the favorableness or otherwise of the weather conditions for crop development during the maturation period.

Korumburra.

At Korumburra the same tale is told from the manure trials conducted there, viz., that it is extremely beneficial to give liberal and judicious manuring to the potato crop. Extra heavy tonnage have been obtained at Korumburra. This is due, not to the fact that the soil at Korumburra is inherently richer than that at Childers, but largely, if not wholly, to the moisture-retention capabilities of the grey clay loam soils of this part of the State. The dressing of 6 cwt. superphosphate and 1 cwt. of ammonium sulphate is amongst the leaders again, but is not so marked here as at certain other experimental stations.

During the past season the heaviest percentage yield was obtained from the No. 7 dressing, viz., 6 cwt. superphosphate and 1 cwt. ammonium sulphate in conjunction with 1 cwt. sulphate of potash per acre. The increase in the case of the No. 7 dressing, however, did not justify (in this season) the extra cost involved.

SOIL ANALYSIS, KORUMBURRA.

				Parts per 100,000.
Nitrogen	..	..	..	216
Phosphoric acid	..	..	..	44
Potash	..	..	..	199
Lime	..	..	..	92

The greatest deficiency shown here is in phosphoric acid, which is very low.

TABLE III.—RESULTS OF TRIALS AT KORUMBURRA, 1927-28.

Conducted on the farm of W. H. C. Holmes (grey clay loam soil).

Plot.	Manure per acre.	Market size Tubers.	Increase due to Manure.	Manure Cost per Acre.	Cost per ton Increase.	Per- centage Increase.
		T. c. q.	T. c. q.	£ s. d.	£ s. d.	%
1	3 cwt. super.	8 0 2	1 12 0	0 19 6	0 12 2	25
2	6 cwt. super.	10 9 0	4 0 2	1 19 0	0 9 9	62
3	9 cwt. super.	11 5 0	4 16 2	2 18 6	0 12 2	75
4	6 cwt. super. 1 cwt. pot. sulph.	12 17 0	6 8 2	2 14 0	0 8 5	100
5	No manure	6 8 2	..	..	..	..
6	6 cwt. super., 1 cwt. ammon. sulph.	12 17 0	6 8 2	2 15 9	0 8 8	100
7	6 cwt. super., 1 cwt. ammon. sulph., 1 cwt. pot. sulph. ..	13 8 0	6 19 2	3 10 9	0 10 2	108
8	3 cwt. market garden ..	8 17 0	1 8 2	1 8 6	1 0 0	21
9	3 cwt. basic phosphate ..	8 14 0	1 5 2	0 19 6	0 15 8	19

When we take the average of the past five years, however, we find the "6 and 1" combination in the position of having the greatest influence on the crop of any of the manure forms or rates experimented with in this district, and in complete accord with the results obtained from the majority of the experimental stations throughout the State.

TABLE IV.—AVERAGE RESULTS AT KORUMBURRA FOR FIVE YEARS, 1922-23 TO 1927-28 (INCLUSIVE).

Plot.	Manure per acre.	Yields.	Increase due to Manure.	Per- centage Increase.
		T. c. q.	T. c. q.	%
1	3 cwt. super.	8 5 1	3 0 3	57
2	6 cwt. super.	9 7 1	4 2 3	78
3	9 cwt. super.	9 11 1	4 6 3	82
4	6 cwt. super., 1 cwt. pot. sulph. ..	9 16 2	4 12 0	88
5	No manure	5 4 2	..	..
6	6 cwt. super., 1 cwt. ammon. sulph. ..	10 15 0.	5 10 2	105
7	6 cwt. super., 1 cwt. ammon. sulph., 1 cwt. pot sulph.	10 12 1	5 7 3	102
8	3 cwt. market garden	7 13 2	2 9 0	..
9	3 cwt. basic phosphate	7 7 1	2 2 3	40

In calculating the cost per ton of manures, £1 per ton has been added to Melbourne prices to cover cost of transport.

During the past season the effect of lime at the rate of 1 ton per acre was again tested, and again lime failed to justify its application. The previous season the average depression caused by liming was 2 tons 8 cwt. 1 qr. per acre. This season the average depression amounted to 18½ cwt. per acre. This continued adverse effect of lime certainly suggests the advisability of its not being used, but it is remarkable that

no explanation can be given as to the reason for its failing to have any beneficial influence. Its effect is marked in other countries by improved soil conditions and increased crops. Yet although there exists the same mechanical condition and chemical composition of soil in this State, an adverse result is produced. This is a matter for the scientific agriculturist to do research work on, but the practical potato grower in the meantime can save himself the expense of lime.

The lime results given hereunder speak for themselves.

TABLE V.—EFFECT OF LIME APPLIED AT THE RATE OF 1 TON TO THE ACRE AT KORUMBURRA, 1927-28.

Plot.	Manure per acre.	Limed.	Unlimed.	Decrease due to Lime.
		T. c. q.	T. c. q.	T. c. q.
1	3 cwt. super.	8 0 2	8 0 2	...
2	6 cwt. super.	8 11 1	10 9 0	1 17 3
3	9 cwt. super.	11 0 0	11 5 0	0 5 0
4	6 cwt. super., 1 cwt. pot. sulph.	11 15 0	12 17 0	1 2 0
5	No manure	5 7 0	6 8 2	1 1 2
6	6 cwt. super., 1 cwt. ammon. sulph.	12 1 0	12 17 0	0 16 0
7	6 cwt. super., 1 cwt. ammon. sulph., 1 cwt. pot. sulph.	12 1 0	13 8 0	1 7 0
8	3 cwt. market garden	8 0 2	8 17 0	0 16 2
9	3 cwt. basic phosphate	7 10 0	8 14 0	1 4 0

Average depression in the crop due to lime, 18 $\frac{3}{4}$ cwt. per acre.

Catani.

At Catani much the same results have been obtained, though the percentage increases due to manuring are greater than at the two stations for which figures have already been given.

Once again we find the "6 and 1" dressing (No. 6) head and shoulders above the other manurial treatments applied on the experimental areas. During the past season the increase from this particular manure reached 211 per cent. The soil at Catani is a swamp peat, very responsive to manures and very easy to work. Its physical character makes it eminently suited to potato culture.

SOIL ANALYSIS, CATANI.

	Parts per 100,000.
Nitrogen	627
Phosphoric acid	176
Potash	193
Lime	408

This soil appears to be highly charged with nitrogen and lime, and fair in phosphoric acid. In the face of this the results shown in tables VI., VII., and VIII. are the more interesting.

TABLE VI.—RESULTS OF TRIALS AT CATANI, 1927-28.

Conducted on the farm of E. Cleverley (swamp peat soil).

Plot.	Manure per acre.	Market size Tubers.	Increase due to Manure.	Manure Cost per Acre.	Cost per ton Increase.	Per centage Increase.
		T. c q.	T. c. q.	£ s. d.	£ s. d.	%
1	3 cwt. super.	3 7 2	2 0 0	0 19 6	0 8 9	148
2	6 cwt. super.	3 10 0	2 2 2	1 19 0	0 19 0	155
3	9 cwt. super.	3 12 2	2 5 0	2 18 6	1 8 0	164
4	6 cwt. super. 1 cwt. pot. sulph.	3 12 2	2 5 0	2 14 0	1 4 0	164
5	No manure	1 7 2	..	..	..	..
6	6 cwt. super., 1 cwt. ammon. sulph	4 5 0	2 17 2	2 15 9	0 19 10	211
7	6 cwt. super., 1 cwt. ammon. sulph., 1 cwt. pot. sulph. ..	3 15 0	2 7 2	3 10 9	1 10 0	173
8	3 cwt. market garden manure	3 7 2	2 0 0	1 8 6	0 14 3	148
9	3 cwt. basic phosphate ..	2 15 0	1 7 2	0 19 6	0 14 4	100
10	1 cwt. di-ammonium phos. ..	3 5 0	1 17 2	1 18 6	1 0 0	137
11	2 cwt. di-ammonium phos. ..	3 15 0	2 2 2	3 17 0	1 19 0	155
12	Farmer's lot (7 cwt. super.)	3 7 2	2 0 0	2 2 0	1 0 0	155

In calculating cost of manures, £1 per ton has been added to Melbourne prices to cover cost of transport.

It will be noted that in every case where any manure was applied there is a constant increase—the increases last season ranging from 100 per cent. to 211 per cent. The yields were not heavy at this station; the season having been an adverse one. Being a fairly early district, the crop was too far advanced to benefit fully from the late summer rains from January onwards, and consequently light yields were recorded.

The adverse season did not prevent the manures functioning sufficiently to prove the necessity of its application as will be seen from the above table.

At Catani, as at Childers, the di-ammonium phosphate manure was applied with very satisfactory results, although here again the figures suggest that for this soil, which requires heavy phosphatic treatment, the di-ammonium phosphate seems to require fortification with superphosphate. An interesting comparison is shown in the above table with the farmer's other crop manured with 7 cwt. per acre super.

Certain soil is unique, inasmuch as it is the only potato land in Victoria (on which tests have been made) which responds at all to lime applications. The response, however, is spasmodic and certainly does not justify the cost incurred in lime treatment. The lime results are given in Table VII.

TABLE VII.—EFFECT OF LIME ON YIELDS OF POTATOES GROWN AT CATANI, 1927-28.

Plot.	Manure per acre.	Limed.	Unlimed.	Variation.
		1 ton per acre.		
		T. c. q.	T. c. q.	T. c. q.
1	3 cwt. super.	3 7 2	3 5 0	-0 2 2
2	6 cwt. super.	3 10 0	3 10 0	..
3	9 cwt. super.	3 12 2	3 10 0	-0 2 2
4	6 cwt. super., 1 cwt. pot. sulph. ..	3 12 2	4 1 3	+0 9 1
5	No manure	1 7 2	1 5 0	-0 2 2
6	6 cwt. super., 1 cwt. ammon. sulph. ..	4 5 0	5 12 2	+1 7 2
7	6 cwt. super., 1 cwt. ammon. sulph., 1 cwt. pot. sulph.	3 15 0	5 5 0	+1 10 0
8	3 cwt. market garden manure	3 7 2	3 7 2	..
9	3 cwt. basic phosphate	2 15 0	3 0 0	+0 5 0

Average increase over nine plots, due to liming, 6 cwt. per acre.

To appreciate the lime results fully, it should be remembered that the cost per acre for lime spread on the ground would approximate £3, which is a very material increase to crop costs.

The averages of the results from the various manures used at Catani for the last five years are available this season, and are given in Table VIII. It will be seen that the most profitable manure at this station is again No. 6 dressing, viz., 6 cwt. superphosphate and 1 cwt. sulphate of ammonia. The No. 7 dressing containing the same as No. 6, with the addition of potassium sulphate at the rate of 1 cwt. per acre, gave a very small increase over the five years, but this increase is not all commensurate with the cost of the extra manure.

TABLE VIII.—AVERAGE RESULTS AT CATANI FOR FIVE YEARS, 1923-24 TO 1927-28 (INCLUSIVE).

Plot.	Manure per acre.	Yields.	Increase due to Manure.	Per-centage Increase.
		T. c. q.	T. c. q.	%.
1	3 cwt. super.	4 18 3	2 2 0	73
2	6 cwt. super.	5 9 0	2 12 1	91
3	9 cwt. super.	4 7 3	2 11 0	90
4	6 cwt. super., 1 cwt. pot. sulph. ..	5 5 1	2 8 2	84
5	No manure, ...	2 16 3	..	..
6	6 cwt. super., 1 cwt. ammon. sulph. ..	7 1 1	4 4 2	148
7	6 cwt. super., 1 cwt. ammon. sulph., 1 cwt. pot. sulph.	7 2 0	4 5 1	149
8	3 cwt. market garden manure	4 18 2	2 1 3	73
9	3 cwt. basic phosphate	5 10 1	2 13 2	91

TABLE IX.—AVERAGE RESULTS FOR FIVE YEARS (1923-24 TO 1927-28)
FOR THREE GIPPSLAND POTATO EXPERIMENTAL STATIONS—CHILDERS,
CATANI, KORUMBURRA.

Plot.	Manure per acre.	Yields.	Increase due to Manure.	Per- centage Increase.
		T. c. q.	T. c. q.	%
1	3 cwt. super.	6 5 1	2 13 0	73
2	6 cwt. super.	7 0 0	3 7 3	93
3	9 cwt. super.	6 8 2	2 16 1	77
4	6 cwt. super., 1 cwt. pot. sulph.	7 3 0	3 10 3	97
5	No manure	3 12 1	.. .. .	..
6	6 cwt. super., 1 cwt. ammon. sulph.	8 7 3	4 15 2	132
7	6 cwt. super., 1 cwt. ammon. sulph., 1 cwt. pot. sulph.	8 4 1	4 12 0	127
8	3 cwt. market garden manure	6 0 3	2 8 2	66
9	3 cwt. basic phosphate	6 1 2	2 9 1	68

Warragul.

The Warragul returns present an interesting variation from the results obtained at all other stations, on account of the fact that it is the only one giving any appreciable response to potassic treatment. Whatever the cause of this may be the fact remains.

During the past season both plots, No. 4 and No. 7, gave a slightly higher yield than where super. and ammonium sulphate was applied. Nos. 4 and 7, as will be seen from Table X., both have 1 cwt. per acre of potassium sulphate in their manurial dressings.

As the Warragul plots have been carried out for two seasons only, the returns from them cannot be regarded as being so conclusive as those from stations where trials have been carried out for five years. They indicate, however, along what lines of manuring the optimum application of artificial manure may be found for this class of soil for potato crops.

For instance, superphosphate at the rate of about 6 cwt. per acre seems to be the best rate of application for that manure, and it is a matter of continuing the trials over a series of years to determine the benefits generally to be derived from ammonium sulphate and potassium sulphate.

On plot 10 at Warragul a test was made with 1 cwt. diammonium phosphate per acre, and this dressing yielded moderately well. The figures for the year will be found in Table X.

TABLE X.—RESULTS OF TRIALS AT WARRAGUL, 1927-28.
Conducted on the farm of C. Adkins (clay loam soil).

Plot.	Manures per acre.	Market size Tubers.	Increase due to Manure.	Manure Cost per Ton.	Cost per ton Increase.	Percentage Increase.
		T. c. q.	T. c. q.	£ s. d.	£ s. d.	%
1	3 cwt. super.	7 10 0	4 8 2	0 19 6	0 4 3	144
2	6 cwt. super.	9 18 0	6 16 2	1 19 0	0 5 9	224
3	9 cwt. super.	10 3 2	7 2 0	2 18 6	0 8 2	234
4	6 cwt. super., 1 cwt. pot. sulph.	10 14 1	7 12 3	2 14 0	0 7 0	250
5	No manure	3 1 2	..	..	..	..
6	6 cwt. super., 1 cwt. sulph. ammon.	10 3 2	7 2 0	2 15 9	0 7 10	234
7	6 cwt. super., 1 cwt. sulph. ammon., 1 cwt. sulph. pot.	10 14 1	7 12 3	3 10 9	0 9 3	250
8	3 cwt. market garden	7 10 0	4 8 2	1 8 6	0 6 7	144
9	3 cwt. basic phosphate	7 10 0	4 8 2	0 19 6	0 4 5	144
10	1 cwt. di-ammonium phos. ..	8 17 0	4 15 2	1 18 6	0 8 1	155

The average results of the manurial variations for the two years the plots have been in existence at Warragul are set out in Table XI. From it will be seen that No. 4 dressing containing 6 cwt. super-phosphate and 1 cwt. potassium sulphate is appreciably higher in yield than any of the others, while the unmanured plot shows very badly by comparison.

TABLE XI.—RESULTS OF TESTS AT WARRAGUL WITH MANURE APPLIED IN THE FURROW AS AGAINST MANURE SOWN BROADCAST.

Plot.	Manures per Acre.	Furrow.	Broadcast.	Increase in favour of Furrow Sowing.
		T. c. q.	T. c. q.	T. c. q.
1	3 cwt. super.	7 10 0	6 3 0	1 7 0
2	6 cwt. super.	9 18 0	8 11 2	1 6 2
3	9 cwt. super.	10 3 2	8 17 0	1 6 2
4	6 cwt. super., 1 cwt. pot. sulph.	10 14 1	9 5 0	1 9 1
5	No manure	3 1 2	3 1 2	..
6	6 cwt. super., 1 cwt. sulph. ammon.	10 3 2	9 10 0	0 13 2
7	6 cwt. super., 1 cwt. sulph. ammon., 1 cwt. sulph. pot.	10 14 1	9 10 0	1 4 1
8	3 cwt. market garden	7 10 0	5 7 1	2 2 3
9	3 cwt. basic phosphate	7 10 0	5 7 1	2 2 3
10	1 cwt. di-ammonium phos.	8 17 0	8 17 0	..

Average increase due to furrow sowing of manure, over ten plots, 1 ton 3 cwt. 1 qr.

There is still extant amongst growers a good deal of difference of opinion regarding whether manures are more effective if applied in the furrow with the seed or applied broadcast before or after the planting of the crop. There is no question as to which is the better manner of application. In all cases where a test of this has been carried

out the placing either by hand or machine of the manure in the furrow gives better results than if it be broadcast.

At Warragul last season the comparison was made between furrow sowing and broadcasting first and then ploughing in. Table XI. shows the results which are altogether in favour of the furrow sowing. It will be noticed that the increase was constant when furrow sowing took place. It is safe to say that the difference would have been more marked if the manures had been broadcast and harrowed in after the sowing of the crops. An experiment carried out some years ago shows that the potato plant takes up its food supply from the soil at a very much more rapid rate in the early stages of its growth, and progressive diminution of the rate of food assimilation obtains as the plant progresses to maturity. That being so, it is essential that the plant food supplied artificially should be placed in close proximity to the root system, so that it may be available from the earliest root development.

The results from this test are tabulated in Table XI., and show a considerable percentage increase where furrow sowing was done.

TABLE XII.—AVERAGE RESULTS AT WARRAGUL FOR TWO YEARS, 1926-27 AND 1927-28.

Plot.	Manures per Acre.	Yields.	Increase due to Manure.	Per-centage Increase.
		T. c. q.	T. c. q.	%
1	3 cwt. super.	10 2 2	5 2 2	102
2	6 cwt. super.	11 6 2	6 6 2	126
3	9 cwt. super.	11 11 3	6 11 3	131
4	6 cwt. super., 1 cwt. pot. sulph. ..	12 17 0	7 17 0	157
5	No manure	5 0 0	.. .. .	..
6	6 cwt. super., 1 cwt. sulph. ammon. ..	11 15 2	6 15 2	135
7	6 cwt. super., 1 cwt. sulph. ammon., 1 cwt. sulph. pot.	12 7 0	7 7 0	147
8	3 cwt. market garden	9 6 1	4 6 1	86
9	3 cwt. basic phosphate	9 14 3	4 14 3	94

Illowa.

Last year for the first time experimental manure plots on potatoes were instituted at Illowa in the Western District near Warrnambool. The soil is a rich red volcanic loam of very high fertility. Unfortunately the season was unfavorable. Planting in this district takes place very early—about the beginning of August as a general rule. Owing to the lateness of the date at which arrangements were made to establish the trials, planting here was not done until September, and the subsequent weather was too dry for full growth to be made.

When the rains came in January the crop was too far advanced to benefit much from these. Nevertheless, the figures obtained are interesting and illuminating because of the fact that it is contended by many in the district that this class of soil would not respond to manures.

The variation of manures tested was the standard adopted on all of the Gippsland centres. The indications from this year's figures

are that this soil, like the red volcanic loams of the central highlands of Victoria, will not answer to much heavier dressings of superphosphate than somewhere about 3 cwt. per acre. There is, however, every indication, even in this adverse season, that the Illowa soil requires fortification by manuring for the growth of the best yields. Potassium sulphate shows no benefit as evidenced by the result of plots 4 and 7. Ammonium sulphate, however, has been decidedly beneficial, and in conjunction with 6 cwt. superphosphate it produced an increase over no manure of 42 per cent.

Taking the various applications of superphosphate, viz., 3 cwt., 6 cwt., and 9 cwt. per acre, it is remarkable that the heavier dressings should give a depression in the yield when compared with 3 cwt. superphosphate per acre. Why this decreased yield should result can only be surmised. As at other stations, in arriving at these figures expressing the yield from the different manurial treatment, four lots were harvested from each plot, and the average of these is the weight per acre presented. Further trials must be conducted at Illowa before any definite conclusions can be arrived at.

TABLE XIII.—RESULTS OF TRIALS AT ILLOWA, 1927-28.
Conducted on the farm of Messrs. Sheen Bros. (red volcanic loam.)

Plot.	Manures per acre.	Market size Tubers.	Increase due to Manure.	Manure Cost per Acre.	Cost per ton Increase.	Per- centage Increase.
		T. c. q.	T. c. q.	£ s. d.	£ s. d.	%
1	3 cwt. super.	4 16 1	1 1 1	0 19 6	0 18 10	28
2	6 cwt. super.	4 5 3	0 10 3	1 19 0	3 10 0	14
3	9 cwt. super.	4 5 3	0 10 3	2 18 6	5 5 0	14
4	6 cwt. super., 1 cwt. pot. sulph.	4 0 1	0 5 1	2 14 0	10 16 0	7
5	No manure	3 15 0	..	..	..	..
6	6 cwt. super., 1 cwt. sulph. ammon.	5 7 0	1 12 0	2 15 9	1 15 0	42
7	6 cwt. super., 1 cwt. sulph. ammon., 1 cwt. sulph. pot.	5 7 0	1 12 0	3 10 9	2 4 0	42
8	3 cwt. market garden manure	4 13 3	0 18 3	1 8 6	1 10 6	25
9	3 cwt. basic phosphate	3 15 0	..	0 19 6	0 19 6 (loss)	..
10	Farm lot (3 cwt. super.) ..	4 17 2	1 2 2	0 19 6	0 17 8	30

In calculating the cost of the manure, £1 per ton has been added to Melbourne prices to cover cost of transport.

Wheatsheaf and Musk.

For the second year since the establishment of these plots in the Daylesford district excellent results have been obtained, inasmuch as definite increases have been obtained from the application of manures. In this district it was for many years the custom to sow all crops without any manure—relying on cultivation and natural fertility of the soil to produce satisfactory yields. The soil did that certainly, but the experience of manuring during the past two seasons has forcibly demonstrated that the former practice of doing without the aid of manure must have meant a very considerable loss in revenue

to the farmers. The results indicate that the medium dressing of superphosphate at the rate of 6 cwt. per acre and ammonium sulphate at the rate of 1 cwt. per acre is the most profitable at these two centres. This manurial combination has been tested during the past five years on many classes of soil, and through many seasonal variations it is remarkable how consistent it has been giving the best results on all stations.

From the following tables it will be seen that Wheatsheaf and Musk soils are no exception. At Wheatsheaf the range of increase over no manure is from 36 per cent. in the case of 3 cwt. super. per acre to 66 per cent. in the case of the 6 and 1 application to plot No. 7. These percentages are taken from the two years' average, and were practically the same each year.

TABLE XIV.—RESULTS OF TRIALS AT WHEATSHEAF, 1927-28.
Conducted on the farm of Mr. James Gooch (red loam soil).

Plot.	Manures per acre.	Market size Tubers.	Increase due to Manure.	Manure Cost per Acre.	Cost per ton Increase.	Percentage Increase.
		T. c. q.	T. c. q.	£ s. d.	£ s. d.	%
1	3 cwt. super.	8 15 2	2 9 2	0 19 6	0 8 0	31
2	6 cwt. super.	9 7 1	3 1 1	1 19 0	0 12 7	48
3	9 cwt. super.	9 19 2	3 13 2	2 18 6	0 16 0	58
4	6 cwt. super., 1 cwt. pot. sulph.	9 7 1	3 1 1	2 14 0	0 17 8	48
5	No manure	6 6 0	..	..	..	..
6	6 cwt. super., 1 cwt. ammon. sulph.	10 10 1	4 4 1	2 15 9	0 13 4	66
7	6 cwt. super., 1 cwt. ammon. sulph., 1 cwt. pot. sulph. ..	9 5 0	2 19 0	3 10 9	1 4 0	47
8	3 cwt. market garden ..	9 4 3	2 18 3	1 8 6	0 9 8	46
9	3 cwt. basic phosphate ..	9 4 3	2 18 3	0 19 6	0 6 5	46
10	Farm lot (3 cwt. super.) ..	7 14 0	1 8 0	0 19 6	0 14 0	22

In calculating the cost of manures, £1 per ton has been added to Melbourne prices to cover cost of transport.

TABLE XV.—AVERAGE RESULTS AT WHEATSHEAF FOR TWO YEARS, 1926-27 AND 1927-28.

Plot.	Manures per Acre.	Yields.	Increase due to Manure.	Percentage Increase.
		T. c. q.	T. c. q.	%
1	3 cwt. super.	5 13 2	1 10 0	36
2	6 cwt. super.	6 3 3	2 0 1	48
3	9 cwt. super.	6 14 3	2 11 1	61
4	6 cwt. super., 1 cwt. pot. sulph. ..	6 7 1	2 3 3	52
5	No manure	4 3 2	..	..
6	6 cwt. super., 1 cwt. ammon. sulph. ..	6 18 2	2 15 0	66
7	6 cwt. super., 1 cwt. ammon. sulph., 1 cwt. pot. sulph.	6 11 1	2 7 3	57
8	3 cwt. market garden	6 4 3	2 1 1	49
9	3 cwt. basic phosphate	5 14 2	1 11 0	37

SOIL ANALYSIS, WHEATSHCAF.

Parts per 100,000.			
Nitrogen	..	..	140
Phosphoric acid	..	..	79
Potash	..	..	177
Lime	..	..	332

The Wheatshcaf results indicate that it is not altogether advisable to be guided entirely by soil analysis in the matter of applying manures. This is illustrated by results given. The response given by super-phosphate to make up the deficiency of phosphoric acid in the soil is good, but there is very little or no resulting increase from the application of potash, although this element is calculated to be below par.

The application of nitrogen in conjunction with phosphoric acid has shown consistent improvement in weight of crop, notwithstanding the fact that this soil is apparently amply supplied naturally with this element. All of these results show most conclusively the necessity for field trials to demonstrate which manures will give the best returns on any particular class of soils.

The rainfall at Wheatshcaf, 1927-28 season, is shown hereunder. This was phenomenally heavy, amounting to no less than 1,692 points for the months of October, 1927, to May, 1928, inclusive. The continued rains from January to May had the effect of prolonging the growing period considerably:—

RAINFALL.

October, 1927	..	..	134
November	..	..	9
December	..	..	146
January, 1928	..	..	470
February	..	..	318
March	..	..	311
April	..	..	90
May	..	..	214

Total 1,692 points.

At Musk the percentage increases are appreciably higher than those obtained at Wheatshcaf, but the order of beneficial influence of manures remains much the same, the "6 and 1" application again showing to the best advantage. At both of these places, however, it is very advisable that this experimental work be continued for some years in order that the findings of the past two years may be substantiated completely, or some modification of manuring other than those showing to the best advantage at present be proved.

The figures for the Musk plots are given hereunder.

TABLE XVI.—RESULTS OF TRIALS AT MUSK, 1927-28.
Conducted on the farm of Mr. E. Bull (brown light loam).

Plot.	Manures per Acre.	Market Size Tubers.	Increase due to Manure.	Manure Cost p.a.	Cost per ton Increase.	Percentage Increase.
		T. c. q.	T. c. q.	£ s. d.	£ s. d.	%.
1	3 cwt. super.	6 2 2	2 12 2	0 19 6	0 7 6	74
2	6 cwt. super.	7 0 0	3 10 0	1 19 0	0 11 1	100
3	9 cwt. super.	7 0 0	3 10 0	2 18 6	0 16 8	100
4	6 cwt. super., 1 cwt. pot. sulph.	6 10 0	3 0 0	2 14 0	0 18 0	85
5	No manure	3 10 0	.. ..	.. ..	.. ..	..
6	6 cwt. super., 1 cwt. sulph. amm.	8 5 0	4 15 0	2 15 9	0 11 8	135
7	6 cwt. super., 1 cwt. sulph. amm., 1 cwt. sulph. potash	7 15 0	4 5 0	3 10 9	0 16 9	121
8	3 cwt. market garden manure	5 17 2	2 7 2	1 8 6	0 12 1	67
9	3 cwt. basic phosphate ..	5 7 2	1 17 2	0 19 6	0 10 2	53
10	Farm lot (3½ cwt. super.)	6 5 0	2 15 0	1 2 9	0 8 4	78

In calculating cost of manures, £1 per ton has been added to Melbourne prices to cover cost of transport.

TABLE XVII.—AVERAGE RESULTS AT MUSK FOR TWO YEARS,
1926-27 AND 1927-28.

Plot.	Manures per Acre.	Yields.	Increase due to Manure.	Percentage Increase.
		T. c. q.	T. c. q.	%.
1	3 cwt. super.	4 14 0	1 14 1	56
2	6 cwt. super.	5 5 2	2 5 3	75
3	9 cwt. super.	5 5 2	2 5 3	75
4	6 cwt. super., 1 cwt. pot. sulph.	5 5 3	2 6 0	75
5	No manure	2 19 3	.. ..	..
6	6 cwt. super., 1 cwt. sulph. amm.	6 2 2	3 2 3	105
7	6 cwt. super., 1 cwt. sulph. amm., 1 cwt. sulph. potash	5 16 1	2 16 2	93
8	3 cwt. market garden manure	4 12 1	1 12 2	53
9	3 cwt. basic phosphate	4 5 1	1 5 2	41

SOIL ANALYSIS, MUSK.

Parts per 100,000.

Nitrogen	291
Phosphoric acid	361
Potash	233
Lime	446

On analysis this soil should not require manuring, as it is apparently highly charged with all the essential food elements. Yet, notwithstanding this, the results of the manure trials show that considerable increases in yield can be obtained from manuring, as will be seen from the results given in the accompanying tables.

(To be continued.)

WHITE-WASH FOR FARMS.

By R. T. McKenzie, Senior Dairy Supervisor.

Although the application of white-wash to cowsheds and dairy premises is fairly general, it is not used as frequently as desirable, for not only does it brighten up dingy walls, but when freshly applied, acts as a germicide and also as a deodorizing agent. It has the great virtue of cheapness, and is easy to apply.

Before a fresh coat of wash is given any shed, the walls should be freed from dust, cob-webs, and the scaly material of previous applications. *This is most important; in no case should lime-wash be used merely to hide dirt.*

Lime-wash can be applied either with a brush or sprayed on. A spray would be more advantageous where there is a big area to cover, or when the walls are of rough splintery material that would pull the fibres out of a brush. Crevices and cracks are easier reached with a spray than with a brush. When a sprayer is to be used the wash should be strained through a couple of thicknesses of cheese cloth, otherwise the nozzle of the sprayer may clog or send out an uneven stream, and patchy work will result.

If a brush be used it should be at least 4 inches wide; an ordinary two-knot white-wash brush is satisfactory. It should be used rapidly without any effort to "brush out" as is done in painting. The mistake is often made of applying too thick a coat; this, when dry, easily flakes off. The application should be fairly thin and transparent; it will become opaque when dry. Two thin coats are better than one thick coat. The first application should be thoroughly dry before the second is given.

How to Make Lime-Washes.

There are many formulae for mixing white-wash. The following are some of the commonest mixtures that have been used with very satisfactory results:—

1. Ten lb. of fresh unslaked lime; 1 lb. of powdered glue; 1 lb. powdered alum. Slake the lime with boiling water. Dissolve the glue, also the alum in hot water, and add to the already slaked lime. Strain the whole and cover for two days when it will be ready to thin for use.

2. Slake some fresh quick lime by adding boiling water. (When the heat ceases the lime is slaked). Thin to the consistency of milk with boiling water; add 1 oz. of alum for each gallon of wash, also 1 pint of flour paste, and apply while hot.

3. Take 4 gallons of butchers' brine, and add 20 lb. of lime previously slaked, and thin with skim milk for use.

4. Soak 4 lb. of casein in 2 gallons of hot water for two hours. Dissolve 2 lb. of trisodium phosphate in a gallon of water. Mix these two and let cool. Make a cream of 25 lb. of slaked lime and 4 gallons of water, and pour into it the above solution, stirring well; add a little formaldehyde, and then mixture for application.

5. Dissolve 1 lb. of salt and $\frac{1}{2}$ lb. of zine sulphate in 1 gallon of boiling water. Make a paste of hydrated lime and water, and pour the solution over it, stirring well. Thin for use with either water or skim milk.

6. Add 1 pint of household ammonia to 1 gallon of water. Soak 3 lb. of casein in 2 gallons of hot water. Make a paste of hydrated lime and water, and pour over it the two solutions, and thin with water for use. Add 1 pint of molasses to each 5 gallons of the wash.

If a gloss be desired in any of these mixtures, it can be obtained by adding a solution of common soap and water; for the purpose dissolve 1 lb. soap in a gallon of boiling water; this would be a sufficient quantity to add to 5 gallons of wash.

LUCERNE TOP-DRESSING TESTS.

Conducted by the Irrigation Investigations Committee.

*By L. C. Bartels, B.Agr.Sc., Senior Irrigation Officer, and
E. T. Beruldsen, B.Agr.Sc., Irrigation Field Officer.*

The accompanying tables give the results for the season 1927-28 from the lucerne top-dressing tests at Swan Hill, Tongala, and Cohuna. The complete returns from the three centres are also given. At Swan Hill the plots have been conducted for four seasons, at Tongala for three, and at Cohuna for two. Splendid results have been obtained at Swan Hill and Tongala, but those from Cohuna are not so good, though they amply prove the value of dressings of superphosphate.

The Value of Superphosphate.

From none of the plots at any of the three centres is there any evidence to support the fear of some sceptics that superphosphate is a stimulant, and that consequently the benefits due to its application cannot be sustained, and, indeed, that its continued use will have a detrimental effect on the soil fertility.

At Swan Hill superphosphate equivalent to 24 cwt. per acre has been put on one plot in four years. This is a heavier dressing than is usually practised. Here, if superphosphate were in any way harmful, one might expect to find its ill-effects intensified; but, instead, it is the best plot in the series, in wonderful contrast to the unmanured plots adjoining it.

The lucerne on the plots at Swan Hill was sown some nine years ago, and it has been rejuvenated. A vigorously growing crop of lucerne improves the soil, and it is safe to say that the heavily manured plot is in better fertility now than ever before.

There has been a root development corresponding to the increased growth above ground, indicating that the sub-soil has been opened up

and enriched by the penetration and decay of roots. These roots have foraged for mineral food to greater depths, and always the surface soil is made more fertile by the decaying leaves, &c. Lucerne is a most effective sub-soiler.

It may be asked, Why should superphosphate alone effect this improvement? It supplies phosphoric acid and also sulphate of calcium. Does the latter material contribute to the increased yield? It contains elements necessary for plant food. But gypsum, one of its constituents, which is sulphate of calcium, fails to give the increased yield that the additional superphosphate does, showing that phosphoric acid is the governing factor.

Nitrogen is an all-important element in plant growth, and good cultural practices, directly or indirectly, are designed to promote supplies of it. Phosphoric acid stimulates the bacteria, the activity of which promotes a heavy growth of lucerne.

Comments on the Results.

Next to the spectacular results on the Swan Hill plots are those on the plots at Tongala, which also give striking evidence of the value of manure, and show that practically 100 per cent. increase in yield can be effected on the Goulburn Valley soils with 4 cwt. of superphosphate. It is on these plots that the cumulative effect of superphosphate is most apparent, because the increase due to manure has become progressively greater each season. The difference between the heavily manured plots and the unmanured plots on each side is very marked.

In computing the results from the test plots, yields are recorded only for the growing period. No record is made of the winter growth, because the plots are grazed after the last cut until August. But not the least valuable result from the manuring is the increased winter growth. There is quite a strong shoot from manured lucerne during the winter; unmanured lucerne is practically dormant, and when feed is scarce this is an important consideration.

Both at Swan Hill and Tongala the plots manured with superphosphate are clean, i.e., there is no undergrowth in the crop; the dense sturdy growth of the lucerne suppresses even tenacious plants such as *Paspalum distichum*, which is spreading on the unmanured plots at Tongala.

There is accumulating evidence to show that the practice of scaring lucerne is of value only for ridding the first cut of weeds, and liberal manuring with superphosphate will achieve the same result without the injury to the lucerne stand which the cultivation entails.

The lucerne-grower on the Swan Hill flats who manures his land liberally can cut as much from his plots in one year as his neighbour who uses no manure will get in three years. In other words, he can get similar results as that neighbour in one-third the time and with practically only one-third the effort. From 25s. to 35s. per acre worth of superphosphate makes the difference. His lucerne is left in better condition, the fodder is more nutritious, feed is available when it is most valuable, and the ground is cleaned. Put in another way, the farmer with 10 acres who manures will get better results than the farmer with 30 acres who does not.

Owing, partly, to a plague of caterpillars, the aggregate yields for the season from the Cohuna plots were not as high as in the previous season, but the increases due to manure were greater; 4 cwt. of super-phosphate increased the yield nearly 50 per cent.

TABLES SHOWING RETURNS IN YIELDS OF HAY PER ACRE
FROM LUCERNE TOP-DRESSING EXPERIMENT PLOTS
(ADJUSTED TO EQUIVALENT YIELDS OF HAY
WITH 15 PER CENT. MOISTURE).

SEASON 1927-28.

I. Swan Hill.

Plot.	1st Cut.	2nd Cut.	3rd Cut.	4th Cut.	5th Cut.	Total.
	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.
1. No manure	5.7	15.0	10.7	14.0	6.0	51.4
2. Super. 6 cwt. p.a.	29.6	44.25	35.0	34.3	18.3	161.45
3. Super. 3 cwt. p.a.	24.2	35.2	26.0	30.3	15.9	131.6
4. No manure	8.7	17.7	12.7	15.7	7.9	62.7
5. Super. 2 cwt. p.a.	18.0	28.4	21.0	22.6	11.8	101.8
6. Super. 4 cwt. p.a. (2 apps.) ..	23.5	38.75	28.6	32.0	16.3	139.15
7. No manure	11.25	21.8	16.6	19.1	9.3	78.05
*8. Super. 2 cwt., lime 1 ton ..	18.25	30.8	22.4	28.3	15.6	115.35
*9. Super. 2 cwt., gypsum 30 cwt. ..	19.9	34.0	23.0	29.1	16.4	122.4
10. No manure	8.8	21.5	13.3	17.3	9.7	70.6
11. Ground rock phosph. 2 cwt. p.a. ..	13.1	26.5	16.9	19.2	10.9	86.6
12. Bone fertilizer 2 cwt. p.a. ..	10.5	23.5	15.0	18.8	11.9	79.7
13. No manure	4.9	17.0	11.3	17.3	7.9	58.4

* Lime and gypsum applied in 1924 and 1927 only.

SUMMARY OF YIELDS.

Plot.	1924-25.	1925-26.	1926-27.	1927-28.	Average Four Seasons.
	cwt.	cwt.	cwt.	cwt.	cwt.
1. No manure	58.5	61.1	47.8	51.4	54.7
2. Super. 6 cwt.	141.9	176.3	183.0	161.45	165.7
3. Super. 3 cwt.	106.7	146.1	152.6	131.6	134.25
4. No manure	67.8	72.7	57.1	62.7	65.1
5. Super. 2 cwt. p.a.	101.2	123.4	120.2	101.8	111.65
6. Super. 4 cwt. p.a.	122.9	159.1	161.4	139.15	145.65
7. No manure	77.5	83.3	73.3	78.05	78.05
8. Super. 2 cwt., lime 1 ton ..	112.5	138.35	135.8	115.35	125.5
9. Super. 2 cwt., gypsum 1½ tons ..	118.5	148.65	139.15	122.4	132.2
10. No manure	74.7	78.25	64.5	70.6	72.0
11. Ground Rock phosph. 2 cwt. p.a. ..	79.1	83.9	84.1	86.6	83.4
12. Bone fertilizer 2 cwt. p.a. ..	87.4	91.1	82.35	79.7	85.15
13. No manure	79.8	71.3	51.25	58.4	65.2

II, Tongala.

Plot.	1st Cut 7.11.17	2nd Cut 15.12.27.	3rd Cut, 30.1.28.	4th Cut, 15.3.28.	5th Cut, 7.5.28.	Total, Five Cuts.
	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.
1. No manure	16·6	21·0	15·6	12·1	7·0	72·3
2. Super. 1 cwt. p.a.	28·1	24·4	19·3	14·4	8·1	94·3
3. Super. 2 cwt. p.a.	28·9	27·26	22·3	15·5	9·1	103·1
4. No manure	16·5	15·7	13·4	11·4	4·8	61·8
5. Super. 4 cwt. p.a.	32·2	30·7	25·5	16·9	12·5	117·8
6. Super. 4 cwt. p.a. (2 apps.)	28·1	27·8	24·3	21·8	12·6	114·6
7. No manure	12·4	14·1	11·6	10·45	4·5	53·05
*8. Super. 2 cwt., lime 1 ton p.a.	29·25	26·7	22·7	16·3	9·4	104·35
*9. Super. 2 cwt., gypsum 1 ton	26·25	26·9	22·3	16·8	9·1	101·3
10. No manure	14·7	14·8	12·9	9·1	4·2	55·6
11. Super. 2 cwt., sulphate of potash 1 cwt.	26·3	26·9	22·5	16·4	9·2	101·3
12. Bone fertilizer 2 cwt. p.a.	18·6	19·6	15·6	12·4	5·25	71·45
13. No manure	12·05	12·5	10·4	8·1	3·1	46·15

* Lime and gypsum applied in 1925 only.

SUMMARY OF YIELDS (THREE SEASONS).

Plot.	1925-26.	1926-27.	1927, 28.	Average.
	cwt.	cwt.	cwt.	cwt.
1. No manure	84·15	91·6	72·3	82·7
2. Super. 1 cwt. p.a.	84·5	98·8	94·3	92·5
3. Super. 2 cwt. p.a.	84·15	101·7	103·1	96·3
4. No manure	67·45	76·3	61·8	68·5
5. Super. 4 cwt. p.a.	90·4	115·2	117·8	107·8
6. Super. 4 cwt. p.a. (2 apps.)	86·65	113·1	114·6	104·8
7. No manure	59·2	62·0	53·05	58·1
8. Super. 2 cwt., lime 1 ton p.a.	77·55	99·2	104·35	93·7
9. Super. 2 cwt., gypsum 1 ton p.a.	75·45	94·7	101·3	90·5
10. No manure	56·2	60·5	55·6	57·4
11. Super. 2 cwt., sulphate of potash 1 cwt.	77·85	88·9	101·3	89·35
12. Bone fertilizer 2 cwt. p.a.	60·4	72·6	71·45	68·15
13. No manure	55·9	53·95	46·15	52·0

III. Cohuna.

Plot.	1st Cut, 21.10.27.	2nd Cut, 25.11.27.	3rd Cut, 6.1.28.	4th Cut, 13.2.28.	5th Cut, 30.3.28.	Total.
	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.
1. No manure	6.7	12.4	8.7	10.1	6.7	44.6
2. Super. 1 cwt. p.a. ..	8.0	13.7	9.6	10.8	7.4	49.5
3. Super. 2 cwt. p.a. ..	9.5	13.8	8.8	9.4	7.6	49.1
4. No manure	6.3	11.6	7.4	7.3	6.5	39.1
5. Super. 4 cwt. p.a. ..	14.7	16.5	10.3	10.35	8.25	60.1
6. Super. 4 cwt. p.a. (2 apps)	12.25	15.6	9.6	10.5	9.15	57.1
7. No manure	6.8	12.3	8.2	7.5	6.4	41.2
*8. Super. 2 cwt., lime 1 ton ..	12.9	16.5	9.0	9.8	8.85	57.05
*9. Super. 2 cwt., gypsum 1 ton ..	12.0	16.8	9.7	10.8	8.45	57.75
10. No manure	8.9	15.5	9.4	10.2	8.05	52.05
11. Super. 2 cwt., sulphate of potash 1 cwt.	12.3	15.6	9.3	10.5	8.85	56.55
12. Bone fertilizer 2 cwt. ...	9.3	14.4	8.0	8.5	7.25	47.45
13. No manure	8.0	14.0	8.6	7.8	7.0	45.4

* Lime and gypsum applied in 1926 only.

SUMMARY OF YIELDS (TWO SEASONS).

Plot.	1926-27.	1927-28.	Average.
	cwt.	cwt.	cwt.
1. No manure	89.7	44.6	67.15
2. Super. 1 cwt. p.a. ..	95.1	49.5	72.3
3. Super. 2 cwt. p.a. ..	93.4	49.1	71.25
4. No manure	86.3	39.1	62.7
5. Super. 4 cwt. p.a. ..	105.8	60.1	82.95
6. Super. 4 cwt. p.a. (2 apps.)	99.9	57.1	78.5
7. No manure	85.2	41.2	63.2
8. Super. 2 cwt., lime 1 ton ..	103.2	57.05	80.12
9. Super. 2 cwt., gypsum 1 ton ..	111.1	57.75	84.4
10. No manure	107.5	52.05	79.8
11. Super. 2 cwt. sulphate of potash 1 cwt.	107.0	56.55	81.8
12. Bone fertilizer 2 cwt. ..	96.9	47.45	72.2
13. No manure	88.6	45.4	67.0

TABLE SHOWING RETURNS FROM MANURING.

IA. Swan Hill.

Plot.	Average Yield p.a.	Check Yields.	Increase due to Manure.	Value of Increase.	Cost of Manure.	Profit.
	cwt.	cwt.	cwt.	£ s. d.	£ s. d.	£ s. d.
No manure	54.7	54.7	..	..	..	..
Super. 6 cwt. p.a. ..	165.7	(58.1)	107.6	13 9 0	1 16 0	11 13 0
Super. 3 cwt. p.a. ..	134.25	(61.6)	72.65	9 1 6	0 18 0	8 3 6
No manure	65.1	65.1	..	..	..	..
Super. 2 cwt. p.a. ..	111.65	(69.4)	42.25	5 5 6	0 12 0	4 13 6
Super. 4 cwt. p.a. ..	145.65	(73.7)	71.95	8 19 9	1 4 0	7 15 9
No manure	78.05	78.05	..	..	..	..
Super. 2 cwt., lime 1 ton p.a.	125.5	(76.0)	49.5	6 3 9	1 12 0	4 11 9
Super. 2 cwt., gypsum 30 cwt. p.a.	132.2	(74.0)	58.2	7 5 6	0 19 6	6 6 0
No manure	72.0	72.0	..	..	..	..
Ground rock phosph., 2 cwt.	83.4	(69.7)	13.7	1 14 3	0 11 0	1 3 3
Bone fertilizer	85.15	(67.5)	17.65	2 4 0	0 18 0	1 6 0
No manure	65.2	65.2	..	..	..	..

Lime and gypsum applied only in 1924 and 1927.

Other manures applied annually.

Lucerne hay valued at £2 10s. per ton.

Superphosphate at £6 per ton.

Lime, £2 per ton.

Gypsum (from Woornen), 10s. per ton.

Ground rock phosphate, £5 10s. per ton.

Bone fertilizer, £9 per ton.

IIA. Tongala.

Plot.	Average Yield p.a.	Check Yield.	Increase.	Value of Increased Yield.	Cost of Manure.	Profit.
	cwt.	cwt.	cwt.	£ s. d.	£ s. d.	£ s. d.
1. No manure	82.7	82.7	..	..	..	..
2. Super. 1 cwt. p.a. ..	92.5	(78.0)	14.5	1 16 3	0 6 0	1 0 3
3. Super. 2 cwt. p.a. ..	96.3	(73.3)	23.0	2 17 6	0 12 0	2 5 6
4. No manure	68.5	68.5	..	..	..	..
5. Super. 4 cwt. p.a. ..	107.8	(65.0)	42.8	5 7 0	1 4 0	4 3 0
6. Super. 4 cwt. p.a. (2 apps.)	104.8	(61.5)	43.3	5 8 3	1 4 0	4 4 3
7. No manure	58.1	58.1	..	..	..	..
8. Super. 2 cwt., lime 1 ton	93.7	(57.9)	35.8	4 9 6	1 5 6	3 4 0
9. Super. 2 cwt., gypsum 1 ton	90.5	(57.6)	32.9	4 2 3	1 2 0	3 0 3
10. No manure	57.4	57.4	..	..	..	..
11. Super. 2 cwt., sulph. of potash 1 cwt.	89.35	(55.6)	33.75	4 4 3	1 7 0	2 17 3
12. Bone fertilizer 2 cwt. ..	68.15	(53.8)	14.35	1 15 9	0 18 0	0 17 9
13. No manure	52.0	52.0	..	..	..	..

III. A. Cohuna.

Plot.	Average Yield p.a.	Check Yield.	Increase.	Value of Increased Yield.	Cost of Manure.	Profit.
	cwt.	cwt.	cwt.	£ s. d.	£ s. d.	£ s. d.
1. No manure	67.15	67.15	..	0 ..	0 ..	0 ..
2. Super. 1 cwt. p.a. ..	72.3	(65.65)	6.65	0 16 6	0 6 0	0 10 6
3. Super. 2 cwt. p.a. ..	71.25	(64.15)	7.1	0 17 9	0 12 0	0 5 9
4. No manure	62.7	62.7	..	0 ..	0 ..	0 ..
5. Super. 4 cwt. p.a. ..	82.95	(62.9)	20.05	2 10 0	1 4 0	1 6 0
6. Super. 4 cwt. p.a. (2 apps.)	78.5	(63.0)	15.5	1 18 9	1 4 0	0 14 9
7. No manure	63.2	63.2	..	0 ..	0 ..	0 ..
8. Super. 2 cwt., lime 1 ton	80.12	(68.8)	11.32	1 9 6	1 12 0	0 2 6 (loss)
9. Super. 2 cwt., gypsum 1 ton	84.4	(74.4)	10.0	1 5 0	1 7 0	0 2 0 (loss)
10. No manure	79.8	79.8	..	0 ..	0 ..	0 ..
11. Super. 2 cwt., sulph. of potash 1 cwt.	81.8	(75.5)	6.3	0 15 9	1 7 0	0 11 3 (loss)
12. Bone fertilizer, 2 cwt. ..	72.2	(71.2)	1.0	0 2 6	0 18 0	0 15 6 (loss)
13. No manure	67.0	67.0	..	..	..	..

Hay valued at £2 10s.

Cost of superphosphate reckoned at £6 per ton; lime, £2; gypsum, £1 10s.; sulphate of potash, £15; bone fertilizer, £9.

NOTE.—No. 10 in the Cohuna plots is abnormally high.

SOME USES FOR PRESERVED FRUITS, ETC.

By Miss A. Knight, Fruit Preserving Expert.

Soup from Tomato Pulp.

An appetising soup can be made from plain tomato pulp. For this, take about one and a half cups of plain tomato pulp (about the contents of a pint jar), one medium sized onion, one and half tablespoonfuls of cornflour, a pinch of carbonate of soda, half teaspoon of salt and a little pepper, one teaspoon of sugar, and about one pint of milk.

Put the tomato pulp into a saucepan, add the peeled and cut-up onion, and boil them for ten minutes with the lid on the saucepan. Stir the mixture occasionally, so as to prevent scorching (the solid part of the pulp is inclined to settle on the bottom of the saucepan, unless occasionally stirred). After it has simmered for about ten minutes or so, or until the onion has sufficiently flavoured it, rub the mixture through a wire, or hair sieve. The sieve should have a mesh of a suitable size to keep back both skins and seeds. Return the sieved pulp to the saucepan, and add the carbonate of soda to it. The object of the carbonate of soda is to neutralize the acid in the tomato before the milk is added. Also add the salt, pepper, and sugar at this time. The cornflour should be mixed with a little water, and stirred in also.

Then boil the mixture for a few minutes, so as to cook the cornflour. Meanwhile, heat the milk in a double boiler, or place the jug of milk in a saucepan of water, and let the water in the saucepan boil,

so that the milk becomes very hot (though not boiling). Then stir the hot milk gradually into the tomato mixture, but do not allow it to boil after adding the milk.

Points to remember when making soup with tomato pulp—

1. Cook the pulp and onion for ten minutes or so.
2. Pass the mixture through a sieve.
3. Reheat the strained pulp, and add seasoning, carbonate of soda, and cornflour.
4. Boil for a few minutes so as to thoroughly cook cornflour.
5. Lastly, gradually stir in the hot milk.

Serve the soup on heated dishes, with little squares of crisp, fried, or toasted bread. Bread having a close texture and fairly free from holes is the best to use, preferably one and a half to two days' old. Usually a square tin loaf is liked best for the purpose. Cut the slices about one-third or half an inch in thickness. Remove the crust; cut the slices into strips, and then into squares, or if desired they may be cut with a fancy or oval cutter. If they are to be fried, they should be placed in a frying basket, and immersed in smoking hot fat.

As soon as the blocks take colour (which should be in a few seconds) turn them immediately into a gravy strainer, and then on to kitchen paper till quite free from grease. They should be crisp, dry, and of an amber colour, and should, of course, be served hot.

Another way to make them is to dip the blocks of bread into savory stock or gravy until they are saturated, then place them on a greased tin, and brown them evenly in the oven.

For serving with tomato soup these are sometimes lightly sprinkled with grated cheese.

Perhaps a word or two regarding the sieving of the pulp will not be out of place, for the success of the puree will largely depend on thorough sieving.

There should be very little waste in the process if it be properly done. Some beginners, I believe, experience a little difficulty at first. I find the best way is to place the sieve in a mixing bowl, having the shallow part of the sieve uppermost. Pour a small quantity of the pulp on top of the sieve, and with a wooden spoon rub the mixture through. The most practical way is to hold the spoon close up to the bowl, and place two fingers in the hollow of the spoon. By this means a firm pressure can be given, and the rubbing done with the back of the spoon. As little as possible should be left on top of the sieve when finished. Occasionally the underneath of the sieve should be scraped with another spoon, so as to keep the sieve free.

If a particularly smooth and creamy soup is desired, the sieved puree should be passed through a tammy cloth.

Another Tomato Pulp Dish.

A nice entree dish can be made from tomato pulp as follows:—

Material required—One cupful of sieved tomato pulp, 4 oz. macaroni, 1 oz. flour, 1 oz. butter, pepper and salt to taste.

The method of making is—Break the macaroni into short lengths, and cook it in fast boiling salted water. This usually takes about half an hour. Turn it into a colander, and run a little cold water through it. Meanwhile, melt the butter in a saucepan, add the flour,

and cook it for a few minutes; then add the strained tomato, sugar, pepper, and salt.

Let this boil for a few minutes, then add the macaroni, and when thoroughly heated, turn the mixture on to a hot dish, and serve whilst very hot.

Preserved Fruit Sandwiches.

Preserved fruits of various kinds, also sweet spiced vegetables, are excellent for making into dainty sandwiches, suitable for picnic hampers, serving at afternoon tea, &c. Here is a nice dried fruit mixture—

2 oz. dried figs, 2 oz. dates, 1 oz. seeded raisins, one tablespoonful of ground almonds.

The way to make them is this:—After stoning the dates, and removing the hard stem from the figs, pass them all through a food mincer, using a fairly fine cutting blade.

Then work the almond meal into the mixture, and if it appears to be too firm, moisten it with a few drops of orange or lemon juice, or a little sugar and water. Care should be taken not to make the mixture too moist.

Press the mixture into a small basin, and allow it to remain for two hours or so. Then when required for the sandwiches, turn it out of the basin, and with a very sharp knife cut thin slices, and place them between thin slices of buttered bread. If a sweeter filling is desired, a little castor sugar may be worked into the mixture before setting into the basin.

If preferred a thinner mixture may be made, which could be spread on the buttered bread, or used as a cake filling. In this case the minced fruit may be moistened to any degree with either passion fruit, orange or lemon juice, or with a little plain or flavoured syrup.

Spiced prunes are also very nice for sandwiches.

The materials required are a few spiced prunes, a little boiled ham or beef, a few nice crisp lettuce leaves, and some thin slices of buttered bread.

Drain some of the prunes from the spiced dressing in which they have been preserved, remove the stones, and pound the fruit in a basin. Cut thin slices of either white or brown bread, and spread with butter. Put a crisp lettuce leaf on one buttered slice, and place on the leaf a thin layer of spiced prune, and very finely cut ham or beef; and cover this with another lettuce leaf; and then the top slice of buttered bread. Cut into triangles or into any desired shapes.

The unbroken lettuce leaf prevents any moisture from the prune soaking into the bread, and is also a pleasant addition to the sandwich. When preparing the lettuce for sandwiches, use the inside leaves, which are more crisp and tender. Wash them and carefully wipe off the surface moisture before using them.

Sweet pickled gherkins also make nice sandwiches. For these you will require—

Three small gherkins, two tablespoonfuls of home-potted steak, crisp lettuce leaves, thin slices of white or brown bread, buttered.

Prepare these sandwiches in the same way as those made from spiced prunes.

STALLION REGISTER 1928-29, under the Horse Breeding Acts 1919 and 1925.

Part I.—Registrations prior to the 1st August, 1928.

Cert. No.	Name.	Age.	Class.	Owner.	Address.
298	Admiral Howard	Yrs. A	Draught ..	Holland Bros. ..	Sheep Hills
503	Ahitana Admiral	3	" ..	Mitchell and O'Brien	Melbourne
183	Al Borak ..	A	Light ..	L. Bennett ..	Robin Vale
223	Allandale ..	A	Draught ..	T. H. Burdett ..	Hopetoun
105	Almore ..	6	" ..	E. R. Campbell	Yaapeet
342	Amyville Fashion	5	" ..	C. Williams ..	Thornton
356	Ardmore ..	A	" ..	Pollock Bros. ..	Derby
381	Athlete ..	A	Pony ..	G. Hobson ..	Sale
255	Aurelius ..	A	Light ..	N. S. Lett ..	Sale
136	Avon Dale ..	A	Draught ..	E. Fowler ..	Anakio
184	Avon Lea ..	A	" ..	Jas. Leitch ..	Wodonga West
439	Bangaroo Honour	5	" ..	C. A. Schulze Jnr.	Jeparit
126	Bannockburn ..	A	" ..	G. W. Francis ..	Lower Norton
449	Baritone ..	A	" ..	D. L. Bodey ..	Jung
45	Barney II. ..	A	Pony ..	A. W. Thomson	Hamilton
450	Baron Brayton ..	3	Draught ..	D. L. Bodey ..	Jung
199.	" Cedric ..	A	" ..	Geo. Luckie ..	Springhurst
489.	" Chief ..	5	" ..	S. E. McIntyre ..	Condah
107	" Clover ..	A	" ..	J. Lord ..	Boigbeat
138	" Dale ..	6	" ..	E. Coad ..	Cobden
163	" Darnley ..	4	" ..	G. E. M. Manus	Sea Lake
22	" Douglas ..	A	" ..	T. Buckley ..	Romsey
500	" Fenwick ..	A	" ..	H. C. Wilson ..	Raywood
435	" Footprint ..	3	" ..	G. Jackson Jnr.	Piree
166	" Fyvie ..	6	" ..	C. Murphy ..	Benalla
451	" Jim ..	4	" ..	Pearse Bros. ..	Kewell North
185	" Juno ..	A	" ..	T. Wallbridge Pty. Ltd.	Melbourne
137	" Lee ..	A	" ..	J. Beechey ..	Terang
9	" Major ..	A	" ..	Krelle and Henke	Boolite
225	" May ..	A	" ..	H. W. O'Berin ..	Goornong
1	" Newfield ..	6	" ..	W. Jardine ..	Rathscar
431	" Willie ..	5	" ..	D. Holden ..	Katunga
200	" Pettie ..	5	" ..	J. Price ..	Mologa
46	" Regulus ..	A	" ..	A. Dolman ..	Neilborough
66	" Silk ..	A	" ..	K. Cameron ..	Warracknabeal
167	" Stewart ..	A	" ..	R. Day ..	Nathalia
316	" Watte ..	A	" ..	F. A. Tonnisson	Moutajup
23	" Weerite ..	A	" ..	J. Manifold ..	Weerite
257	Baronet ..	6	" ..	A. Cameron ..	Warracknabeal
334	Baron's Best ..	4	" ..	J. H. Meyer ..	Kaniva
124	Baron's Favourite	A	" ..	J. R. McKenzie ..	Pinnaroo
226	Baron's Pride ..	A	" ..	J. J. Quinn ..	Elmore
490	Baroona Boomerang	4	" ..	S. W. Cooke ..	Hamilton
168	Basella ..	A	Thoro'bred	R. O'Halloran ..	Granya
289	Beau Fils ..	A	" ..	Exors of the Late W. E. Mitchell	Corryong
491	Belgian's Choice ..	4	Draught ..	F. R. Widdicombe	Digby
416	Belmain ..	A	" ..	J. McKie ..	Sea Lake
77	Belmont ..	A	" ..	J. T. Poynton ..	Ensay South
382	" Print ..	A	" ..	J. M. Egan ..	Woodleigh
399	" Stephen ..	3	" ..	C. Hewitt & Sons	Werrigar E.

STALLION REGISTER, 1928-29—continued.

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
67	Belmont's Champion	A	Draught ..	F. Collins ..	Mittyack
341	" Pride ..	4	" ..	T. Parker ..	Pepper's Plains
129	Ben Lomond ..	5	" ..	J. Galloway ..	Majorca
299	" Model ..	A	" ..	H. Adams ..	Yaapeet
205	Benefactor ..	3	" ..	D. Rumbold ..	Baringhup West
467	Bill ..	4	" ..	Malook Singh ..	Manangatang
341	Blair's Pride ..	3	" ..	H. E. Poulton ..	Hopetoun
157	Bingen ..	A	Light ..	W. Watts ..	Kamarooka
258	Blackadder ..	A	Thoro'bred	H. F. and F. W. Hoysted	Wangaratta
259	Black Jack ..	4	Pony ..	R. W. Jukes ..	Maryborough
317	Blackthorn of Penni- wells	5	" ..	Mrs. J. Maclellan	Windsor
210	Bob Craig ..	3	Draught ..	Dunstan Bros. ..	Jeffcott
47	Bobniak ..	A	Light ..	H. F. Clarke ..	Miepoll
300	Bobs ..	6	Draught ..	A. O. Allen ..	Murrayville
152	Bold Action ..	A	" ..	L. Culloden ..	Jung
187	" Agitation ..	A	" ..	G. Crabb ..	Colac
35	" Arthur ..	A	" ..	J. Galloway ..	Majorca
139	" Boy ..	A	" ..	G. Oxley ..	Gre Gre North
293	" Briton ..	5	" ..	Dyke Bros. ..	Gre Gre Village
473	" Captain ..	A	" ..	C. B. Werner ..	Nhill
352	" Craig ..	A	" ..	J. A. Collins ..	Fenton's Creek
402	" Newtown ..	A	" ..	P. K. Tomkins ..	Wando Vale
348	" Scott ..	A	" ..	H. Oliver ..	Duckembegorra
329	" Squire ..	5	" ..	G. E. Schmidt ..	Kellalac
224	" Success ..	5	" ..	J. Rumbold ..	Laanecoorio
301	Bolwalla ..	A	Thoro'bred	Harris and Dunno	Warrnambool
492	Bonnie II. ..	5	Draught ..	R. Price ..	Wallacedale South
373	" Arthur ..	6	" ..	F. Boulton ..	Warracknabeal
227	" Brae ..	A	" ..	H. Goldsmith ..	Corack
15	" Caesar ..	A	Light ..	C. Campbell ..	Lubeck
260	" Knight ..	A	Draught ..	Gerrard Bros. ..	Mangalore West
86	" Salisbury ..	A	" ..	C. H. Feldtmann	Major Plains
434	" Vale ..	4	" ..	H. Boyd ..	Avonmore
463	" Viceroy ..	A	" ..	J. Bungo and Sons	Sheep Hills
162	Bonny Don ..	5	Light ..	A. Boyd ..	Wycheproof
228	" Mac ..	A	Draught ..	W. Hodges ..	Macarthur
87	Bon Wickliffe ..	A	Light ..	J. Ford ..	Wickliffe
339	Boondilla Viccrov	3	Draught ..	J. Dalrymple ..	Willenabrina
417	Border Prince ..	A	" ..	N. S. R. West ..	Corop
463	Breastknot ..	A	" ..	W. J. Moll ..	Dimboola
261	Brewers March ..	A	Light ..	G. Nunan ..	Cobram
88	Brigham's Pride ..	A	Pony ..	S. Christopher ..	Mansfield
48	Bright Star ..	A	Draught ..	Dyke Bros. ..	Gre Gre Village
188	" Treasure ..	A	" ..	M. Thompson ..	Yalca
169	Brilliant Bold ..	A	" ..	R. H. Larcombe	Mt. Moriac
133	British Oak ..	4	" ..	L. Fisher ..	Panitya
439	Briton's Fame ..	4	" ..	C. A. Schulze Jnr.	Hounsells L.B.
36	Brogynryn Handy- man	A	" ..	G. L. Byrne ..	Kewell North
16	Brown Brilliant ..	A	" ..	J. T. Bartlett ..	Barnawartha
418	Brown Lad ..	A	" ..	T. H. Turner ..	Wycheproof
462	Buchlyvics Choice	A	" ..	W. J. Westendorf	Dimboola
396	Bundoran ..	A	Light ..	A. Graham ..	Bacchus Marsh
392	Burnside Baron ..	5	Draught ..	H. C. Younger ..	Greta
459	Bvland's Brilliant	4	" ..	J. Crane ..	Nathalia
206	Byrnwood's Pride	6	" ..	A. T. Hercus ..	Haynam

STALLION REGISTER, 1928-29—continued.

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
229	Captain Black ..	A	Thoro'bred	J. Flannagan ..	Omeo
78	Captain Douglas ..	A	Draught ..	C. S. Rodda ..	Warracknabeal
403	Carmichael ..	A	" ..	Mrs. M. Newman	Benalla
322	Cavalier Supreme	3	" ..	R. C. Dickinson	Yanac South
366	Chal ..	A	Thoro'bred	W. T. Connor ..	Londrigan
198	Clan Fingon ..	A	" ..	Neds Corner Past, Co. Pty. Ltd.	Mildura
378	Clan Newton ..	A	Draught ..	C. V. Colson ..	South Wangaratta
20	Claymore ..	A	Pony ..	J. P. Hanrahan	Ballan
21	Claymore Junior ..	A	" ..	J. P. Hanrahan	Ballan
130	Clifton Lad ..	3	Draught ..	W. Fraser ..	Watchem
215	Clyde Bank ..	5	" ..	J. Hannon ..	Swan Hill
485	" Laddie ..	A	" ..	J. Alexander ..	Caniambo
140	Coast Guard ..	6	" ..	A. Arnold ..	Werrigai East
478	Colonel Douglas ..	6	" ..	A. C. Jorgenson	Katyil
24	Commodore Nut ..	A	Pony ..	J. Manifold ..	Weerite
230	Commonweal ..	A	Draught ..	W. C. Holt ..	Foster
213	Cooring Dale ..	5	" ..	A. N. Hamilton	Bannerton
49	Count Abbey ..	6	Light ..	J. Currie ..	Birchip
190	" Bingen ..	A	" ..	M. G. Porker ..	Tudor
262	Craig Athol ..	6	Draught ..	A. Green ..	Marungi
143	Craigielea of Aber- dour	A	" ..	R. Stewart ..	Tolmie
142	Craigie Masterstroke	A	" ..	A. Arnold ..	Werrigai East
321	Craigiemember ..	3	" ..	W. E. Widger ..	Kellalac
17	Craigieright ..	A	" ..	A. Zanker ..	Jeparit
204	Craig's Ideal ..	3	" ..	Mrs. A. Trollop ..	Cope Cope
263	Crighton's Tim ..	A	Pony ..	S. A. Greaves ..	Narre Warren
394	Crystal Tide ..	4	Draught ..	A. Dickins ..	Corowa
494	Culbo ..	4	Pony ..	A. W. Thompson	Hamilton
335	Cymro Harold ..	4	" ..	E. J. Boyle ..	Kaniva
8	Dalmore ..	A	Draught ..	H. Woods ..	Watchem
214	" Dan ..	5	" ..	W. H. King ..	Ultima
380	" Pride ..	A	" ..	A. Mitchell ..	Hopetoun
170	Dalmore's Choice ..	A	" ..	A. G. Turnbull ..	Coleraine
476	Dan Bells ..	A	Light ..	H. G. Gregerson	Benalla
264	Dandy Duke ..	A	Pony ..	Kong Meng Bros.	Longwood
51	Darling's Comet ..	A	Draught ..	Brook Bros. ..	Moe
336	Dave Douglas ..	5	" ..	B. Schultz ..	Ni Ni Well
108	Desert Star ..	A	Pony ..	A. Mann ..	Walwa
318	Dideyme of Penni- wells	A	" ..	Mrs. Maclellan	Windsor
254	Direct Argot ..	A	Light ...	R. Matchett ..	Bendigo
109	Donald's Best ..	A	Draught ..	D. Kelly ..	Kunat
404	Donnibristle ..	A	" ..	J. G. Wilson ..	Milawa
477	Double Court ..	A	Thoro'bred	C. F. Wheeler ..	Towong
412	Douglas Chief ..	A	Draught ..	D. Trewick ..	Elmore
436	Drum Major ..	4	" ..	R. S. Brunt ..	Kyabram
219	Drummer Boy ..	6	" ..	T. Finnigan ..	Chinkapook
7	Drumore ..	A	Thoro'bred	C. Nolte ..	Tahara
295	Drumry Equipment	A	Draught ..	J. Maher ..	Tatura
437	Drumry's Pride ..	4	Draught ..	J. Maher ..	Tatura
190	Drysdale ..	A	" ..	W. Crozier ..	South Morang
265	Duddon ..	A	Thoro'bred	A. P. Wade ..	Glen Alvie
419	Duke Little Eyes	A	Draught ..	A. E. Bowman ..	Ebden
64	Dukemore ..	6	" ..	J. E. Maxwell ..	Hopetoun
507	Dundonald's Chief	A	" ..	H. Doherty ..	Yundool

STALLION REGISTER, 1928-29--continued.

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
266	Dunure Blend ..	A	Draught ..	Hehr Bros. ..	Woolert
442	Dunira James ..	5	" ..	G. H. Allen ..	Beulah
212	Ebony Stamp ..	5	" ..	McCrae and Thorn ton	Bulla
415	El Dorado ..	A	Thoro'bred	F. B. Healey ..	Kaniva
6	Emerson ..	A	" ..	A. S. Blair ..	Watchem
52	Enterprise ..	6	Draught ..	J. H. Meyer ..	Kaniva
144	Ettrick Dale ..	A	" ..	J. Fuzzard ..	Numurkah
313	Everlasting Dale ..	A	" ..	W. Pizer ..	Kyneton
231	Excel ..	A	Pony ..	W. C. Holt ..	Foster
37	Fabrikofts Heir ..	A	Draught ..	W. Cheesley ..	Barnawartha
53	Farmer's Pride ..	6	" ..	H. W. Gepp ..	Kangaroo Grounds
133	Fashion's Pride ..	4	" ..	R. J. Pilgrim ..	Gro Gro Village
68	Favourite Bold ..	A	" ..	A. C. Jeffrey ..	Tallygaroopna West
267	Federal Duke ..	A	" ..	W. Thompson ..	Glenalbyn
69	Federation ..	A	Pony ..	A. J. Cannon ..	Irrewillipe East
430	Fenwick's Pride ..	4	Draught ..	O. Bassett ..	Sandmount
127	Field Rover ..	6	Thoro'bred	J. O'Keefe ..	Shepparton
132	Fine View Baron Royal	5	Draught	W. H. Gibbons ..	Galah
302	First Voyage ..	A	Light ..	W. J. Minns ..	Melton
484	Fitzallan ..	A	Draught ..	Vaughan Bros. ..	Warracknabeal
209	Flash Bute ..	4	" ..	J. H. Poyner ..	Lilydale
161	Flashlink ..	3	" ..	T. H. Grose ..	Buckrabanyule
124	Flash Garland ..	A	" ..	J. R. McKenzie ..	Pinnaroo
387	" Pettadale ..	4	" ..	A. Stokes ..	Abbotsford
493	Flashlea ..	4	" ..	G. Grey ..	Branxholme
372	Foreigner ..	A	Pony ..	E. Vesey ..	Colac
92	Foreman ..	A	Draught ..	E. R. Morton ..	Drouin
171	Free Scot ..	A	Light ..	S. Baulch ..	Orford
145	Galtee ..	A	Thoro'bred	T. Walsh ..	Glenmaggie
405	Gay Willie ..	A	Draught ..	King and Son ..	Rutherglen
312	General Favourite ..	6	" ..	Mrs. E. Heid ..	Sunshine
25	General Garland ..	6	" ..	H. McKinley ..	Rochford
106	General Gordon ..	A	Light ..	Sharp and Taylor	South Melbourne
5	Gillies Son ..	A	Draught ..	Boyd Bros. ..	Minhamito
483	Glen Arthur ..	A	" ..	J. Alexander ..	Caniambo
176	Glen Arthur ..	A	" ..	R. L. Henderson	Burumbet
395	Glen Cairn ..	5	" ..	W. T. Mitchell ..	Lower Bethanga
268	Glen Isla ..	A	" ..	F. Perry ..	Corack
443	Glenlivet ..	5	" ..	H. McCluskey ..	Strathmerton
391	Glenmore's Premier	3	" ..	J. J. Smith ..	Goorambat
146	Gold Brew ..	A	Thoro'bred	Mrs. A. White ..	Dunkeld
232	Golden Hue ..	A	Light ..	T. Bridgeman Jnr.	Alvie
323	Graculus ..	A	Thoro'bred	S. Loveridge ..	Corowa
59	Grampian Lad ..	A	Draught ..	Richards and Son	Gymbowen
233	Hampton Ben ..	A	" ..	P. Seelander ..	Warracknabeal
172	Harvest King ..	A	Thoro'bred	P. C. Nixon ..	Orbost
444	Heather Mac ..	3	Draught ..	Fuller and Sprigg	Mitro
34	Heir Apparent ..	A	Thoro'bred	Defence Dept. ..	Melbourne
191	Hermes of Shetland Heights	A	Pony ..	J. Laidlaw ..	Penshurst
474	Hero's Lad ..	4	Draught ..	W. Fowler ..	Rangio
93	High Degree ..	A	" ..	J. F. Blight ..	Cowangio
94	High Honor ..	A	" ..	C. H. Feldtman	Major Plains
420	Hillhead Knight ..	A	" ..	S. M. Frankel ..	Nhill
333	Ian Again ..	3	" ..	C. C. Hawker ..	Lillimur

STALLION REGISTER, 1928-29—continued.

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
235	Ian McClelland ..	A	Draught ..	H. Naylor ..	Warracknabeal
499	Interest ..	A	Pony ..	A. Kennedy ..	Arcadia
104	Invermany ..	A	Draught ..	S. G. Hayward ..	Nth. Wangaratta
421	Ironsides ..	A	Thoro'bred	Jas. Purss ..	Walwa
147	Jack ..	A	Draught ..	W. Fanning ..	Wyuna
222	" Craig ..	5	" ..	Shields and Oxley	Eddington
119	" Huon ..	A	Light ..	I. G. Coad ..	Moyston
234	" Marsh ..	A	Thoro'bred	J. F. McDonald	Bacchus Marsh
182	Jacko ..	6	Draught ..	B. F. Schnaars ..	Netherby
148	James Osterley ..	A	Light ..	A. Huddleston ..	Geelong
324	Jock Cedric ..	A	Draught ..	J. W. Gardner ..	Cavendish
65	" MacGregor ..	A	" ..	Reseigh and Flock- art	Reseigh
422	John Douglas ..	A	" ..	J. King ..	Lillimur
328	John O'Dale ..	3	" ..	K. Cameron ..	Warracknabeal
79	Justice ..	A	" ..	A. Stansbury ..	Piangil
445	Kelso Ideal ..	5	" ..	Starritt Bros. ..	North-west Moor- oopna
18	Kelvin ..	A	" ..	D. M. Kinnon ..	Beazley's Bridge
269	Khamasin ..	A	Light ..	J. J. Byrne ..	Frankston
270	Khartoun ..	A	Draught ..	D. Munro ..	Casterton
95	Killawney ..	A	" ..	E. Neville ..	Marnoo
236	Kilty ..	A	Light ..	H. J. Rodwell ..	Amphitheatre
38	King Ballance ..	A	Draught ..	J. H. Kennett ..	Kaniva
271	King Bruce ..	A	Pony ..	J. Pearce ..	Wodonga
237	" Clyde ..	A	Draught ..	W. Bean ..	Sale
482	King of the Roses II.	A	" ..	M. McGillivray ..	Bald Rock
423	King of the Shep- herds	A	" ..	J. Hughes ..	Yaaput
424	King's First ..	A	" ..	C. A. Jolly ..	Woomelang
238	" Treasure ..	A	Thoro'bred	J. Adams ..	Mansfield
149	Kitchener ..	A	Draught ..	Oldham and White	Dunkeld
272	Kitchener's Pride	A	" ..	A. Cheesley ..	Barnawartha
357	Kolara Radiant ..	3	" ..	McKenzie Bros.	Wallup
203	Korongah Craig- willie	4	" ..	J. Davison ..	Donald
159	Lancashire Chief	A	" ..	C. H. Pearson ..	Green Lake
128	" Lad ..	A	" ..	W. Robinson ..	Armstrong
239	Langdale ..	A	" ..	M. Donnellan ..	Jeffcott North
502	Lansdale Everest	6	" ..	J. T. Bartlett ..	Barnawartha
383	Lee Creek Squire	A	" ..	Mrs. H. McCon- achey	Winchelsea
116	Leo's Pride ..	A	Pony ..	Miss G. Small ..	Notting Hill
240	Little Eumarrah ..	A	" ..	R. Painter ..	Leaghur
303	Little Welshman	A	" ..	J. Cameron ..	Timor West
70	Lochaber ..	A	Light ..	H. Watson ..	Ross Creek
460	Lochinvar ..	A	Pony ..	A. Cameron ..	Warracknabeal
363	Lord Aldie ..	A	Draught ..	S. E. Mackieson ..	Buchan
192	" Allan ..	A	" ..	L. C. Barnes ..	Watchem
241	" Armadale ..	A	" ..	H. Lee ..	Clunes
54	" Cedric ..	A	" ..	F. A. Lehmann ..	Lismore
242	" Dalmuir ..	A	" ..	G. E. Mibus ..	Moutajup
332	" Erskine Again	3	" ..	J. H. Meyer ..	Kaniva
314	" Everest ..	A	" ..	T. Hore ..	Leitchville
211	" Huntly ..	5	" ..	McCrae and Thorn- ton	Bulla
110	" Northcote ..	A	" ..	W. Hicks ..	Kaniva

STALLION REGISTER, 1928-29—continued.

Cert. No.	Name.	Age.	Class.	Owner.	Address.
410	Lord Plunton ..	Yrs. A	Draught ..	M. J. and J. Runci- man	Swan Hill
465	„ Ronald ..	A	„ ..	J. La Pouple ..	Heathcote
96	„ Threave ..	A	„ ..	W. J. Schmidt ..	Jeparit
377	„ Welkin ..	A	Thoro'bred	D. H. Carmichael	Swan Hill
243	Lucky Boy ..	A	Draught ..	Graham Bros. ..	Bacchus Marsh
19	„ Jim ..	A	„ ..	Exors J. Morris	Woolsthorpe
304	Lue Ribbons. ..	A	Light ..	Williams Bros. ..	Ross Creek
120	Lymm Truffle 2nd	A	Draught ..	J. C. Wallis ..	Wolseley, S.A.
150	Lyndale ..	6	„ ..	A. Arnold	Werrigar East
72	Lyndhurst ..	A	„ ..	Semmler Bros.	Hopetoun
73	McAgain ..	A	„ ..	H. E. Pilgrim ..	Winiam
349	Macedon Hero ..	A	„ ..	B. Evans ..	Woodfield
111	Magician ..	A	„ ..	T. Adkins ..	Korumburra
207	Major Mac ..	4	„ ..	H. Henderson ..	Barraport
80	„ Willie ..	A	„ ..	A. S. Alexander ..	Diapur
273	Mallee Chavalier ..	A	„ ..	W. A. Hammill ..	Sale
496	Maori ..	A	„ ..	K. Müller ..	Carwarp
425	„ Chief ..	A	Light ..	J. Caldwell ..	Winchelsea
274	„ Jack ..	A	Draught ..	A. Potter ..	Naroghid
305	Marchfield ..	A	„ ..	J. Shelly ..	Echuca
319	Marcus ..	A	Light ..	Miss B. Reid ..	Bundoora
173	Marcus Junior ...	A	„ ..	Blair Bros. ..	Lara
217	Mark Twain ..	5	Draught ..	H. Wharton ..	Manangatang
193	Marquis Bold ..	A	„ ..	Fawcett Bros. ..	Burke's Flat
398	„ Dundonald	4	„ ..	C. H. Fisher ..	Kenley
2	Marvin's Heir ..	A	Light ..	J. Cantwell ..	West Melbourne
411	Master Brook ..	5	„ ..	A. Beattie ..	Tungamah
218	„ Dale ..	4	Draught ..	F. F. Kerr ..	Koroop
84	May Duke of Penni- wells	5	Pony ..	Mrs. Dora McLean	Toorak
97	Meredin ..	6	Draught ..	W. G. Roberts ..	Kerang
517	Merry Prince ..	5	„ ..	B. Rogers ..	Mepunga
370	Metal Bells ..	A	Light ..	J. Lee ..	Invergordon
81	Mid-day ..	A	Pony ..	J. Bannam ..	Wallacedale
174	Mikado ..	A	Thoro'bred	A. G. Turnbull ..	Coleraine
291	Moiria Lad ..	A	Draught ..	C. R. Cunningham	Bamawm Ex.
244	Mont Harold ..	A	Light ..	W. Curtis ..	Glen Waverley
43	Moredun Baron ..	A	Draught ..	F. Tilley ..	Port Fairy
296	„ Ranger ..	A	„ ..	J. R. Mitchell ..	Sandford
151	Morocco Chief ..	A	„ ..	A. Arnold ..	Werrigar East
275	„ Lad ..	A	„ ..	Mrs. E. Parish ..	Horsham
44	Mountain Twig ..	A	Pony ..	J. H. Medlyn ..	St. Arnaud
374	Napoleon ..	A	Draught ..	S. J. Lewis ..	Maldon
388	Nelson Chief ..	5	„ ..	L. Morrish ..	Bullarook
306	Nether Craigends	6	„ ..	T. Thornton ..	Waaia
98	Netherall ..	6	„ ..	J. B. Ferguson ..	Waubra
441	Newfield's Pride ..	A	„ ..	J. M. Martin ..	Aubrey-road
112	Newton Banks ..	A	„ ..	J. R. Morrison ..	Terang
426	„ Mains ..	A	„ ..	J. Shanahan ..	Crossley
55	„ Stewart ..	A	„ ..	A. H. Borgelt ..	Nhill
245	„ Style ..	A	„ ..	Currell Bros. ..	Cowley's Creek
276	Noble Glen ..	A	„ ..	W. Nagorcka ..	Tarrington
56	Non Pariel ..	A	„ ..	J. Roberts ..	Calder's Bag
447	Novel Song ..	A	Thoro'bred	Ferguson Bros. ..	Murrumgee
393	Onward Baron Bel- mont	5	Draught ..	Ferguson Bros. ..	Murrumgee

STALLION REGISTER, 1928-29—continued.

Cert. No.	Name.	Age.	Class.	Owner.	Address.
297	Ormond Boy ..	Yrs. 4	Draught ..	Sharp and Taylor	South Melbourne
26	Oscar Siam ..	A	Light ..	H. Fehring ..	Cohuna
360	Overslade ..	5	Draught ..	C. S. Rodda ..	Warracknabeal
57	Pat of Transy ..	A	Pony ..	Mrs. D. McLean	Yan Yean
364	Patrician ..	A	Draught ..	W. Gibbins ..	Galah
343	" Craig ..	4	" ..	A. E. Albert ..	Willaura
58	Pearlyn ..	A	Light ..	F. W. Bowden ..	Won Wron
121	Percival Again ..	A	Draught ..	P. G. Richardson	Pinnarco, S.A.
246	Peris Huon ..	6	Light ..	G. W. Hines ...	Beechworth
175	Periscope ..	6	" ..	J. and M. Ervin	Pyramid
27	Pettadale ..	A	Draught ..	B. McLraith ..	Watchem
347	Present ..	5	Pony ..	J. G. Adams ..	Mansfield
453	Pride of the Lake	5	Thoro'bred	R. F. Blake ..	Green Lake
369	Prince Alto ..	4	Light ..	L. Furey ..	Gredgwin
390	" Buchlyvie ..	3	Draught ..	J. T. Martin ..	Devenish
351	" Charles ..	A	Pony ..	J. Dawkins ..	Colac
165	" Charming ..	5	Draught ..	P. Allan ..	Thalia
113	" Dale ..	A	" ..	Downey and Son	Wallace
454	Princeroy ..	4	" ..	F. H. Baker ..	Jung
152	Prince Que ..	A	Pony ..	Mrs. L. Nicol ..	Dandenong
362	Quality ..	A	" ..	A. E. Callow ..	Ballarat
153	Quatta's Belmont	A	Draught ..	W. Lindsay ..	Baranduda
307	Reality II. ..	A	Pony ..	W. Horswood ..	Emerald
461	Real O.K. ..	4	Draught ..	J. Phillips ..	Congupna-road
60	Red King ..	A	Light ..	A. Matthews ..	Benambra
297	Regis ..	A	Draught ..	E. Manifold ..	Camperdown
501	Resolution ..	5	" ..	Mitchell and O'Brien	Melbourne
122	Review ..	A	" ..	J. Dennon ..	Watchupga
427	Ribbon Bells ..	A	Light ..	H. Gilbert ..	Koriella
123	Rising Star ..	A	Draught ..	J. W. Hood ..	Polkmmet P.O.
41	" Sun ..	6	" ..	J. O'Bree ..	Piangil
475	Robert Bruce ..	A	" ..	H. Gregerson ..	Benalla
62	Rocket ..	A	Pony ..	A. W. Thompson	Hamilton
82	Rosdale ..	A	Draught ..	C. J. Leisfield	Rainbow
366	Roseleaf ..	3	" ..	R. J. Thomson ..	Brim
346	Roy Dale ..	A	" ..	J. A. Todd ..	Beulah
464	Royal ..	A	" ..	J. May ..	Joel Joel
455	" Bellman ..	4	" ..	A. A. Johns ..	Horsham
448	" Ben ..	A	" ..	A. Sadler ..	Leopold
277	" Brigham ..	A	Pony ..	Hinkley and Son	Beac
177	" Bute ..	A	Draught ..	G. Luckie ..	Springhurst
481	" Chief ..	A	" ..	W. G. Burns ..	Goroke
253	" Comedy ..	A	Thoro'bred	L. B. Jones ..	Yarram
337	" Royal Dale ..	5	Draught ..	A. B. Duffy ..	Lorquon
279	" Douglas ..	A	" ..	J. Dugdale ..	Myrniong
247	" Duke ..	A	" ..	Exors Late C. W. Dennert	Hamilton
194	" Fashion ..	A	" ..	F. Shaw ..	Wycheproof
74	" Flush ..	A	" ..	M. Colton ..	Terang
292	" Kerrston ..	4	" ..	McPherson Bros.	Mitchell's Hill
631	" Mac ..	A	Light ..	Charity Bros. ..	Serpentine
195	" McGregor ..	A	Draught ..	Mortlock Bros. ..	Culgoa
331	" Northcote ..	5	" ..	A. Cunningham	Miram
154	" Peter ..	6	" ..	R. E. Hanson ..	Fern Hill
346	" Scotch ..	5	" ..	R. H. Smith ..	Willenabrina
278	" Shepherd ..	A	" ..	T. A. Heard ..	Noradjuha
308	" Style ..	A	" ..	P. Morrissey ..	Molesworth

STALLION REGISTER, 1928-29—continued.

Cert. No.	Name.	Age.	Class.	Owner.	Address.
75	Royal Success ..	Yrs. A	Draught ..	W. Elsom ..	Dart Dart
488	" Top ..	4	" ..	C. McKebery ..	Coleraine
413	" Viceroy ..	6	" ..	G. Buchanan ..	Boort
480	Rufus ..	A	" ..	Mrs. S. E. Kent	Sheep Hills
472	Salvation ..	5	" ..	P. B. Purves ..	Tol Tol
280	Sam Huon ..	A	Light ..	J. P. O'Brien ..	East Melbourne
114	Santa Claus ..	A	Pony ..	W. C. Greaves ..	Monomeith
178	Santrel ..	A	Thoro'bred	R. W. Storey ..	Murchison East
400	Scotch Crown ..	4	Draught ..	R. O'Bree ..	Boundary-road
375	" Laddie ..	A	" ..	H. F. Christenson	Tyers
479	" Prince ..	A	" ..	Evans Bros. ..	Moyhu
350	" Thistle ..	A	" ..	J. Bagnell ..	Mologa
384	Scotland Again ..	A	" ..	T. J. Witherow ..	Wangaratta East
359	" Forever ..	4	" ..	S. Rogers ..	Rainbow
406	Scotland's Dignity	6	" ..	D. L. Bodey ..	Jung
13	" Peer ..	A	" ..	D. Gardner ..	Milawa
117	" Viceroy ..	A	" ..	T. Parker ..	Pepper's Plains
40	Scottish Banker ..	A	" ..	G. L. Byrne ..	Kewell North
99	" Chief ..	A	" ..	J. Bourke ..	Edi
281	" Laird ..	A	" ..	W. Parish ..	Horsham
181	" Prince ..	A	" ..	R. D. Buckley ..	Glenlea
180	Scotty ..	A	" ..	J. Roulston ..	Muskerry East
10	Several ..	A	Thoro'bred	S. Winter Cooke	Hamilton
309	Shanter Junior ..	A	Draught ..	C. Muhleison ..	Leongatha
115	Shepherd King ..	6	" ..	T. Gilchrist ..	Rutherglen
401	Simulium ..	5	Thoro'bred	Sir E. Miller ..	Bacchus Marsh
385	Sir Armadale ..	A	Draught ..	J. Lincoln ..	Portarlington
386	" Douglas Haig]	A	" ..	J. Lincoln ..	Portarlington
28	" George ..	A	Pony ..	J. K. Russell ..	Barunah Plains
327	" George Robin ..	5	Draught ..	K. Cameron ..	Warracknabeal
220	" Royal Charm]	3	" ..	W. B. Monaghan	Speed
471	" Rupert ..	A	" ..	Geo. Kelly ..	Rochester
456	" Walter Brunside	A	" ..	F. Schroeder ..	Carinya
29	Slip Knot ..	A	" ..	J. K. Russell ..	Barunah Plains
83	Soldier Boy of Fenwick	4	Pony ..	Miss S. Robinson	East Kew
486	Southern Lad ..	A	Draught ..	W. L. Chaplin ..	Cowangio
498	Sportsman's Hero	A	" ..	A. Kennedy ..	Arcadia
407	Springbank Lawrence	A	" ..	W. H. Crawford	Hamilton
282	St. Mark]	A	" ..	C. W. George ..	Beulah
397	" Simon ..	A	" ..	G. J. Butler ..	Carisbrook
100	Straightaway ..	A	Light ..	T. Allen ..	Glenloth
414	Style O. ..	A	" ..	Wm. Barry ..	Heathcote
101	Sudbourne's Chief	A	Draught ..	G. H. Stray ..	Tabilk
12	Sum Time ..	A	" ..	N. Richardson ..	Pirlta
89	Sunbeam ..	A	Thoro'bred	H. L. Treasure ..	Stratford
197	Sunbury ..	A	Light ..	T. C. Nolan ..	Tarrawingee
179	Sweet Murillo ..	A	Thoro'bred	E. T. Parslow ..	Omeo
316	Theale Padlock ..	6	Draught	W. McLeod ..	Lucknow
434	The Cavalier ..	5	" ..	L. G. Koch ..	Pine Lodge
354	" Crown ..	A	" ..	E. A. Altman ..	Rainbow
409	" Pride ..	A	" ..	J. E. Montgomery	Leongatha
376	" Standard ..	A	" ..	J. Forsyth ..	Murrayville
353	" Toff ..	6	" ..	R. M. Kenyon ..	Sale
202	Thornfield Craig ..	5	" ..	E. J. Leeder ..	Cope Cop
248	Tim Anton ..	A	Thoro'bred	F. C. Coy, Junr.	Bookar
103	Timely Direct ..	A	Light ..	J. M. Cromie ..	Noble Park

STALLION REGISTER, 1928-29—continued.

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
63	Toby ..	A	Pony ..	A. W. Thompson	Hamilton
4	Tommy Dodd ..	A	" ..	Boyd Bros. ..	Green Hills
102	Top Score ..	A	Draught ..	E. J. Ficken ..	Murrabit
290	Trafalgar ..	A	Thoro'bred	Exors of W. Mitchell	Corryong
470	Trelawney's Pride	A	Draught ..	J. Naim ..	Ouyen
252	Tremenheere Craig	A	" ..	C. N. Davies ..	Rochester West
141	Tressayr ..	A	Thoro'bred	F. Widdicombe	Gymbowen
468	Trevallyn Baron Dale	3	Draught ..	J. Holdsworth ..	Jung
495	Trimmer ..	4	" ..	G. Grey ..	Branxholme
428	True Blue ..	A	" ..	F. J. Wilson ..	Drik Drik
208	" Scotch ..	4	" ..	F. Sutton ..	Gredgwin
283	Udale ..	A	" ..	J. Holdsworth ..	Jung
320	Udale Jack ..	A	" ..	A. J. Pyers ..	Donald
284	Vice Regal ..	A	" ..	W. G. Parish ..	Green Park, Horsham
344	Viceroy Again ..	3	" ..	E. Hewison ..	Willenabrina
516	" Favourite	4	" ..	Harris Bros. ..	Garvoc
39	Vin Direct ..	A	Light ..	J. D. Mulfahey ..	Windsor
469	Vue Dale ..	6	Draught ..	W. W. Quick ..	Mollonghip
3	Vulcan ..	A	Pony ..	Boyd Bros. ..	Minhamito
458	Waikoura ..	5	Draught ..	G. W. Francis ..	Lower Norton
375	Waironga's Model	A	" ..	W. Stewart ..	Turriff
285	Waituna ..	A	" ..	S. A. Greaves ..	Berwick
85	Wakapero ..	A	" ..	G. R. Ladson ..	Mincha
368	Walden's Radiant	A	" ..	H. J. Bunge ..	Sheep Hills
286	Wallace Dale ..	6	" ..	W. J. Dixon ..	Donald
118	War Lord ..	6	" ..	T. Attenborough	Poowong North
90	Welsh Flyer ..	A	Light ¹ ..	P. J. Reid ..	Milawa
446	Widgiewa Alick ..	5	Draught ..	Jackson Bros. ..	Pirce
30	" Belmont	A	" ..	C. H. Perkins ..	Rainbow
160	" Dale ..	6	" ..	Mrs. F. L. Hamilton	Coonooer Bridge
221	" Digger ..	4	" ..	J. W. Menzel ..	Cowangie
42	" Edward ..	A	" ..	W. G. Down ..	Koonda
294	" Fingal ..	6	" ..	F. J. Dart ..	Lah
358	" Footprint ..	3	" ..	C. J. Liesfield ..	Rainbow
371	" Glancer ..	A	" ..	A. Creighton ..	Tungamah
367	" Intent ..	3	" ..	T. A. McRae ..	Wallup
328	" Ivan ..	3	" ..	T. Parker ..	Pepper's Plains
440	" Lebbeus ..	5	" ..	A. Muir ..	Picola North
326	" Leo ..	5	" ..	F. C. Thomas ..	Galaquil
201	" Mark ..	5	" ..	G. R. Ladson ..	Mincha West
14	" Marshal ..	A	" ..	J. Henderson ..	Baulkamaugh North
310	" Ninian ..	A	" ..	P. L. G. Brown	Cohuna
487	" Ormond ..	3	" ..	E. M. Middleton	Hamilton
311	" Sapper ..	A	" ..	G. C. Allen ..	Broughton
196	" Stephen ..	A	" ..	C. Hewitt and Son	Werrigar East
249	William Wallace ..	A	" ..	E. Bish ..	Wycheproof
429	Willie Belmont ..	4	" ..	J. S. P. Allen ..	Broughton
497	" Craig ..	A	" ..	A. T. Leishman	Kingston
164	" Craig of High-bury	4	" ..	T. Kerr ..	Thalia
457	" McBride ..	5	" ..	T. Moroney ..	Barnedown
325	Willies Knight ..	3	" ..	H. Redford ..	Gymbowen
287	Windlesham ..	A	Thoro'bred	W. T. Hillman ..	Bendigo
250	Winning Hit ..	A	Draught ..	J. Hargreaves ..	Eskdale
379	Worthy Mac ..	A	" ..	J. Elliott ..	Cooma

STALLION REGISTER, 1928-29—*continued*.

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
158	Yeneda ..	A	Draught ..	P. O'Loughlin ..	Noorat
216	Young Clyde ..	3	" ..	S. J. Taylor ..	Lake Boga
31	Young Clydeside ..	A	" ..	H. Jager ..	Swan Hill
155	" Coronation	A	" ..	W. J. Bennett	Cannio
76	" Dan ..	A	" ..	J. V. Haggbloom	Sea Lake
91	" Dunsby Victor	6	" ..	E. A. Walker ..	Cowangie
288	" Flashlight	A	" ..	T. Rawson ..	Omeo
251	" Lad ..	A	Pony ..	W. H. Gillett ..	Lara
32	" McLeish ..	A	Draught ..	J. Charlton ..	Stony Creek
33	" Middlemarch	A	" ..	W. D. H. Smith	Dimboola
432	" Sapper ..	5	" ..	H. White ..	Cowangie
156	" Shepherd	A	" ..	G. Chapman ..	Minyip
330	" Threave ..	3	" ..	J. H. Meyer ..	Kaniva

List of Stallions in respect of which Certificates of Registration have been refused but which, the owners having paid the prescribed fees, may be retained for breeding purposes with owners own mares only. Registrations prior to 1st August, 1928 :—

Name.	Age.	Class.	Owner.	Address.
	Yrs.			
Carmichael ..	4	Draught ..	Hanlon, D. ..	Benalla
Clyde ..	A	" ..	Hebard, C. ..	Bulart
Earl Douglas ..	6	" ..	Bauleh, A. V. and E.	Orford
King Cedric ..	A	" ..	McNabb, G. A. ..	Irrewillipe East
Lord Nelson ..	4	" ..	Pendlebury, W. ..	Angip
Lymm Lion ..	A	" ..	Holt, W. G. ..	Woorreen via Leon-gatha
Nugget II. ..	A	" ..	Lord Geo. ..	Eskdale
Ondit ..	6	" ..	Thornley, M. Exors	Hawkesdale
Repeater's Pride ..	4	" ..	Pitt, Geo. ..	Jeparit

ORCHARD AND GARDEN NOTES.

E. E. Pescott, F.L.S., Pomologist.

The Orchard.

If the winter spraying has been delayed, it should be completed as quickly as possible, and before the buds begin to swell and burst.

It is not advisable to spray the stone fruits with the red oil emulsion at this time, as there is danger of burning and destroying the early buds that may be swelling, and consequently loosen their outside scales. It will be safe, if the work be done at once, to spray apple, pear and quince trees with this spray, especially where the Byrobia Mite, scale insects, or woolly aphid are prevalent.

If it is intended that the lime-sulphur wash be the specific for these and other pests, it may be used with safety, although the spraying should be completed as early as possible.

That the lime-sulphur is valuable as a specific against "Black Spot" of the apple was shown in the report of the experiments in the *Journal of Agriculture* for August, 1918. The first spray should be given when the flower buds are more green than pink; and the second spray, when the centre flowers of the blossom cluster are pretty open.

The same report showed that a spray of 6.8.40 of copper-soda, sprayed when the earliest buds were showing pink, was a complete success against the "leaf curl" of the peach.

Where peach aphid has appeared, it will be advisable to spray at once with a strong nicotine solution. Tobacco stems should be soaked in cold water for some days, and a teaspoonful of caustic soda added to a cask of steeping stems. The liquid should be made strong, and every endeavour made to kill out the first insects that appear. The preparations known as Black Leaf 40 and Nicotine Sulphate are useful for this work.

Experiments carried out by the Government Entomologist in 1923 determined that red oil and nicotine sulphate mixed provided an efficient spray for woolly aphid. The mixture was made up of 1 gallon of red oil, 1 pint of nicotine sulphate, and 1 lb. soap, the latter being boiled till dissolved in 1 gallon of water. The red oil was then mixed in, and lastly the nicotine sulphate. To this was added 80 gallons of water. This provided spray material for 100 trees, at a cost of about 11s.

The pruning of deciduous trees should be at an end this month. The pruning of evergreens such as oranges, lemons, and guavas, may be left until later.

Young deciduous trees must be planted not later than this month. The soil should be trodden firm round the roots, and, when planting has been completed, the tree ought to be headed back to three or four buds on each arm.

Preparation may be made for planting citrus and other evergreen trees. It is necessary that the soil be well ploughed and sweetened in anticipation of planting in September and October.

In root-borer affected districts, the beetles will begin to appear during the latter part of the month. A close observance should be kept on them and the insects regularly collected and destroyed.

The Flower Garden.

All winter-flowering shrubs that have dropped their blossoms may now be pruned. It is important to prune these immediately after flowering, so that the plant may be able to make plenty of flowering wood for next season.

Seed beds and plots need constant cleaning and weeding. Weeds must now be kept out of the garden, both by hoeing and hand picking. The seedlings growing in their permanent situations should be thinned out and given a good chance to develop strong and sturdy plants.

Divisions of herbaceous plants such as delphiniums, cannas, shasta daisy, herbaceous chrysanthemums, rudbeckias, salvias, and phlox may still be planted out. If it is intended to leave the plants in the places they occupied last season, they should be lifted, the soil being well dug and manured, and the crowns planted back again. By this means the plants retain their vigour, and are able to produce good flowers each season.

Evergreen shrubs may now be planted out, if the spots chosen for them have been well dug and aired. All beds should be well dug over by this time, manure and refuse litter having been dug into the soil.

A few corms and tubers of early summer flowering bulbous plants, including Gladioli, may now be planted. Gladioli so planted will bloom in December.

The Vegetable Garden.

The plots should be well dug over at this time, adding gypsum or lime where any pests have been prevalent. In other beds stable manure should be well worked into the soil.

The soil should be rich, well worked, and warm, so that a quick growth may result. Vegetables quickly raised are generally more tender than slowly grown ones; and frequent changes of crops in the plots will give better results. At this season, the weeds will require constant checking; frequent use of the hoe will, therefore, be necessary, and in the rows hand-weeding should be resorted to.

All seedlings should be planted out, especially seedlings of cabbage, cauliflower, lettuce, and onion. Seeds of peas, carrots, parsnips, radish, lettuce, tomato, and broad beans may be sown. Add 2 oz. per square yard of nitrate of soda to the cabbage beds.

Where they can be sheltered and protected from frosts, young tomato plants may be planted out for early fruiting. One method of managing these early plants is to place the young plant a few inches below the surface, and then a box, 8 or 9 inches deep, with top and bottom removed, over the plant at ground level. This can then be covered loosely with a piece of glass whenever necessary.

Potatoes, artichokes, and asparagus crowns may be planted. Asparagus beds should be kept free from weeds; they should have a loose surface, and a good top dressing with old manure would be beneficial.

In the frames, cucumber, vegetable marrow, melon, pumpkin, water and rock melon seeds may be planted. These are best planted in pots, placing three or four seeds in each pot; they then suffer no check when being transplanted into beds.

THE GROWING OF CABBAGES.

The main plot for cabbages should be a rich, well prepared soil. Soils supplied with humus, or rich alluvial soils, do not need such heavy manuring, but it is always well to remember that cabbages are very gross feeders. In the case of poor lands the grower should plough or dig in well-rotted farmyard or stable manure, and, where this manure is not available, artificial nitrogenous manures must be used. In any case, better results are obtained when both are properly combined.

A good artificial manure is blood and bone and superphosphate, applied at rates of not less than 6 cwt. per acre. Cabbages will always respond to a top-dressing of either nitrate of soda or sulphate of ammonia (at the rate of 1 cwt. per acre), especially when the "heads" are just beginning to form. These manures (nitrate of soda and sulphate of ammonia), contain nitrogen, which tends to produce leaf growth in plants of any description.

The surface of the ground should be made firm and the plants planted out in rows. The large commercial cabbage is planted about 30 inches between the rows, and about 24 inches between the plants. Naturally, if one of the smaller varieties is grown, the distances can be reduced. If the soil be of poor quality, however, the plants must be given more room and planted 3 feet by 3 feet. On very rich soils the distances can be made rather less than 30 inches by 24 inches to prevent tendency of the cabbage growing too large. Very large "heads" are not desirable from a housekeeper's stand-point, and so should be avoided.

When transplanting, it is advisable to see that the soil is firmly pressed down all round the planted seedlings, and a watering at this stage is most beneficial. Some growers, when dealing with very healthy and well developed plants, cut part of the main root before transplanting into the main plot. When the planter does not grow his own seedlings, he should not keep the plants obtained from the seedsman too long out of the ground.

During the growing period the cabbage must not receive any check in its growth. The best cabbages are those which have grown quickly and steadily, and the grower should aim at producing solid, compact, and sizeable cabbages. The use of plenty of lime or gypsum in soil will help plants to combat finger-and-toe and club-root diseases. Spray for cabbage aphid and moth with nicotine sulphate.

REMINDERS FOR SEPTEMBER

LIVE STOCK.

HORSES.—Feed stabled horses well; give green stuff if available. Continue rugging to encourage the shedding of the coat; good grooming will also be beneficial. Give hay or straw to grass-fed working horses. Feed old and badly-conditioned horses liberally. In foal mares due to foal early, if worked, should be turned out to paddock. Stallions doing stud duty should be fed liberally. Equivalent amount of cracked Indian corn (maize) may with advantage be substituted for oats, if latter grain is scarce.

CATTLE.—Cows should still be rugged, but coverings should be removed frequently, in order to enable the animal to get rid of the old coat, or, better still, a good curry-combing may be given. Continue hay or straw. Look up treatment for milk fever in leaflet issued by Department, and treat cattle accordingly. Give calves a good warm dry shed. Give the milk to young calves at blood heat. Have feeding troughs or buckets clean. Don't over-feed. Feed regularly with regard to quantity and time. Provide a good grass run, or fine hay or crushed oats in a box or trough. Give a cupful of linewater per calf per day in the milk. The problem with many at the present time is how to rear calves without milk. This can be done very well by starting them on new milk for a fortnight, and then gradually substituting the milk with one of the calf meals on the market. To these it would be advisable to add two or three tablespoonfuls

of cod liver oil. The following meal is in general use in Ireland:—Two parts, by weight, of oatmeal, 2 parts maize meal, 1 part pure ground linseed, all finely ground. Scald with boiling water, and allow to stand for twelve hours. Start with new milk, then gradually substitute skim and $\frac{1}{4}$ lb. of the meal mixture per head per day, gradually increasing to 1 lb. or more. In a month milk may be dispensed with altogether. The crushed oats, fed dry, have been found to give excellent results.

Write for Departmental Bulletin on rearing calves.

PIGS.—Supply plenty of bedding in warm well-ventilated sties. Keep sties clean and dry, and feeding troughs clean and wholesome. If pigs are lousy dress with kerosene emulsion or sulphur and lard, or waste motor oil, rubbing well into crevices of skin, and disinfect sties. Worms are very prevalent at present, and may be treated by giving 2 to 10 grains of Santonin in form of pill, or from half to one teaspoonful of oil of turpentine in milk or castor oil. Read Bulletin 16.

SHEEP.—Early-shorn sheep usually thrive, and can be fattened quickly. This is important where it is intended to sell old ewes that are of no further use for breeding purposes or for wool production. Strong Crossbred two-tooth wethers that were unsuitable for export can also be fattened quickly when shorn. Lambs not good enough for freezing should also be shorn early, as they will then fatten on the spring grass, and may be made good enough for the butcher.

Suitable shelter should be available for the protection of sheep off shears, particularly in the early spring months. Where insufficient knowledge of classing crossbred wool exists, draft the coarse sheep from the fine sheep before they enter the shearing shed; there will then be no difficulty in baling the wool separately. All dags should be removed before the sheep are carried by the shearers to the board. When the wool is on the table, avoid deep and careless skirting on small flocks; only very seedy parts, heavy fribs and stains should come off fleeces. Press in a box press, which forms square sides to bales. A pamphlet, setting out the quantity of wool of each class to be put in a bale, is obtainable on application to the Live Stock Division, Department of Agriculture. Brand bales boldly and neatly on the flat side, and adopt any particular directions suggested by your wool broker.

The shed should be very well cleaned of all straw, chaff, dust, &c., before shearing starts; also wash the shearing board down, and at the same time add some disinfectant to the water. Cut back all misshapen feet at shearing time, and treat if necessary. All sheep off shears should be branded clearly; avoid branding on ribs and shoulder; use rump and poll for this purpose. Broken-mouthed ewes, ewes with faulty udders, yellow and common fleeces should be culled and fattened for sale. Well-bred ewe weaners should be classed, and the best retained for future flock purposes. Wool with character, colour, style, length, and density will always be in demand. Character is denoted by the crimp, which should be even and well defined.

Place wool pack in press with the sewn seams towards the fixed side of the press.

POULTRY.—September is the last month for hatching for winter eggs. Incubators should be kept going, and broody hens set. Care must be taken to keep down vermin, as they now breed quickly; use sprays in houses—nothing stunts chickens quicker than vermin. The food for young chicks should be fine oatmeal, biscuit meal, or finely-ground wheat, a little calcined bird's grit, a little chopped green stuff, such as lettuce, thistles, or green lucerne or spring onions occasionally cut fine is a good tonic, and a pinch of powdered charcoal. Slightly moisten with new milk. Make the whole friable, and feed frequently ("little and often") just as much as they will readily eat, as an excess of food only sours and disturbs their digestive organs. Animal food may be given in small quantities after the first ten days once or twice a week. Chickens should be protected from damp ground and the cold, bleak winds.

VINEYARD.

Plantation of young vines (grafted or ungrafted) should be concluded before the commencement of September; pruning of old vines likewise, as well as twisting or tying of rods on long-pruned vines. Prune recently-planted vines just before buds commence to swell (if not pruned when planted), cutting strongest cane back to two buds. Do not delay this work until buds have shot, as this seriously weakens the young vine. Field grafting may be carried out, if weather be fine

and warm. If cold and wet, postpone until October. Swabbing of susceptible sorts (Black Spot control) should not be omitted this wet season. It must be completed before vine buds swell (see last month's reminders). A bulletin (No. 42) dealing with vine Black Spot, will be posted on application. Cultivation (scarifying or discing) must receive attention when soil is in suitable condition.

The danger period for spring frosts is at hand. "Smudging" or smoking is a valuable palliative. Wet and dry bulb thermometer observations usefully forecast these visitations.

Cellar.—Conclude spring racking early in month, if not already done. Fill up, regularly, all unfortified wines.

BEE-KEEPING.

During the first or second week of September all hives should be examined to see that each colony has a laying queen and sufficient stores of honey to permit of normal development. Bees work better with a reserve of stores at this time of year, and when their supplies are reduced to a certain minimum, brood rearing is restricted, and may cease altogether for a time, and when, as a result of prolonged unfavorable weather, the reserve stores are used up, even sealed brood may be torn open and thrown out, and the colonies practically ruined for the season.

Strong colonies should have 15 to 20 lb. of honey ahead of daily requirement, medium and small colonies proportionately less. When during the examination of the hives less than this amount is found, the shortage should be made good by feeding, blood-warm, and inside the hive, a syrup made by dissolving $1\frac{1}{2}$ or 2 parts by measure of best white sugar in one part of boiling water. What is known as a frame feeder is the most suitable one for this purpose, or a simplicity feeder in a shallow super over the brood chamber may be used.

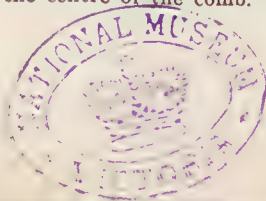
When no feeders are on hand, the syrup may be poured in a fine stream from the lip of a jug into an empty comb laid flat into a suitable dish. The jug should be held about 12 to 15 inches above the comb, otherwise the syrup will not enter the cells. After filling both sides, and keeping it in an upright position for a few minutes to drain off the surplus, the comb can be returned to the hive, repeating the operation on succeeding days till the needs of the colony are supplied. Honey of unknown origin should never be used for feeding on account of the risk of introducing disease.

Any colony found queenless, as indicated by the absence of brood or eggs, may be kept going till a queen can be raised or procured, by giving a comb of eggs or young brood from a strong colony once a week, provided there are sufficient bees left to make it worth while; if too small, unite with the nearest normal colony.

In early districts and where colonies went into Winter strong in bees, swarms may be expected from the beginning of September onwards. Hives and frames for the number of first swarms expected should be on hand and ready for immediate use, so that none of the bees' labour may be wasted by allowing them to build comb in a temporary box. All frames should be wired so that newly-built comb may not break down in handling or during hot weather. Under normal conditions a swarm with a good fertile queen will build all worker comb during the first three weeks. It is the only time a full colony will not build drone comb from starters of foundation. While the queen deposits eggs into the worker cells as fast as they are constructed by the bees there will be no drone cells built. After three weeks the young bees from the first-laid eggs will hatch out, and the queen will return to that part of the comb to again deposit eggs into the vacated cells, and the newly-constructed cells on the edges of the comb being neglected by the queen, the remainder of the space in the frames will be filled with drone comb.

The aim of the bee-keeper, therefore, is to confine the building of comb from starters to the number of frames likely to be completed during the first three weeks after hiving the swarm, by removing two, three, or four frames in which no comb has been built four or five days after hiving. The follower or dummy board is pushed up against the remaining frames, and when these are completed frames with full sheets of foundation are added to make up the set.

Hives should always stand level, crossways to the frames; in the case of swarms hived on starters of foundation it is particularly important. Comb is always built truly perpendicular, and if the hive is not level to the frames the wires will be outside, instead of in the centre of the comb.



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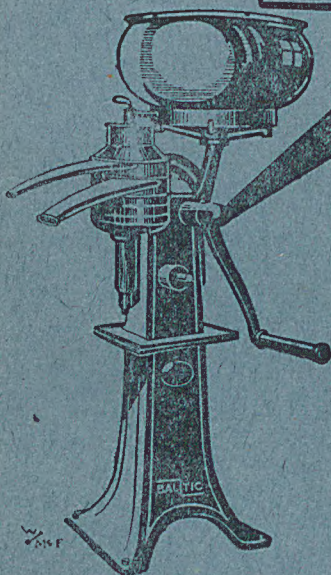
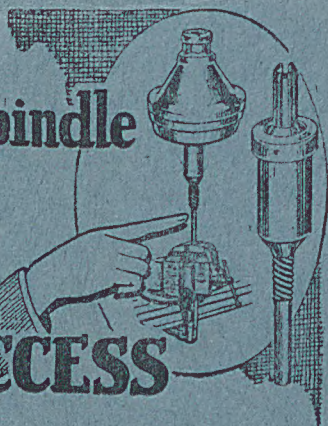
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